

ESCUELA POLITÉCNICA NACIONAL

ESCUELA DE INGENIERÍA

DISEÑO DE UN ISP, BASADO EN LA TECNOLOGÍA *BROADBAND
POWER LINE COMMUNICATIONS*, PARA LA EMPRESA
ELÉCTRICA QUITO S.A.

TOMO II

PROYECTO PREVIO A LA OBTENCIÓN DEL TÍTULO DE INGENIERO EN
ELECTRÓNICA Y REDES DE INFORMACIÓN

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ANEXO A

Documentación Técnica

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INFORMACIÓN DE REFERENCIA SOBRE LAS OPERACIONES DE UN ISP

READYNET

ReadyNet es un proveedor de servicios de Internet y de soluciones informáticas en crecimiento en la ciudad de Quito desde 1999, ofrece servicios dial-up, servicios dedicados ASDL, y servicios de hosting, sirviendo satisfactoriamente a 350 usuarios dial-up, 70 usuarios ASDL residenciales y 22 usuarios comerciales.

Su estructura organizacional le permite responder rápidamente a las necesidades de sus usuarios, con calidad y eficiencia, dividiéndose en tres zonas, una administrativa, comercial y una técnica.

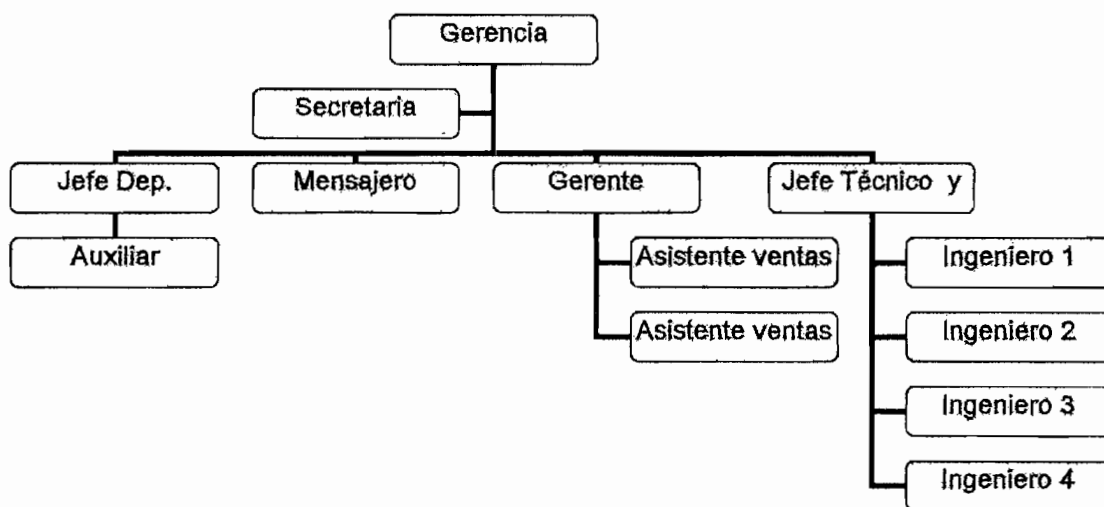


Figura A-1: Organigrama de ReadyNet

El área técnica es responsable del óptimo estado del sistema informático del ISP, se encarga de administrar y gestionar eficientemente los enlaces disponibles, los servidores y otros recursos, de ejecutar instalaciones en el sitio del usuario, y de brindar soporte a los usuarios residenciales y comerciales.

Perfil de tráfico

ReadyNet se caracteriza por ofrecer un servicio de calidad a sus usuarios, su equipo técnico realiza constantes mediciones para determinar cómo están cumpliendo con los acuerdos de nivel de servicio, y continuamente realizan ajustes para afinar dichos niveles.

Como ejemplo de estas mediciones, y como información de referencia, se muestra en la Figura A-2 el perfil de tráfico de los usuarios dial-up y de los usuarios residenciales. Se observa que la capacidad del enlace soporta el tráfico de todos los usuarios conectados en cualquier momento, y que el sobredimensionamiento del enlace es mínimo, para evitar el sobredimensionamiento o la saturación del canal se monitorea constantemente en búsqueda de cambios en el perfil de tráfico.

'Weekly' Graph (30 Minute Average) - Max Speed: 1792.0 kBytes/s

Max	1750.4 kb/s	Average	727.3 kb/s	Current	589.2 kb/s
Entrada:	(12.2%)	Entrada:	(5.1%)	Entrada:	(4.1%)
Max Salida:	855.2 kb/s (6.0%)	Average Salida:	312.7 kb/s (2.2%)	Current Salida:	141.9 kb/s (1.0%)

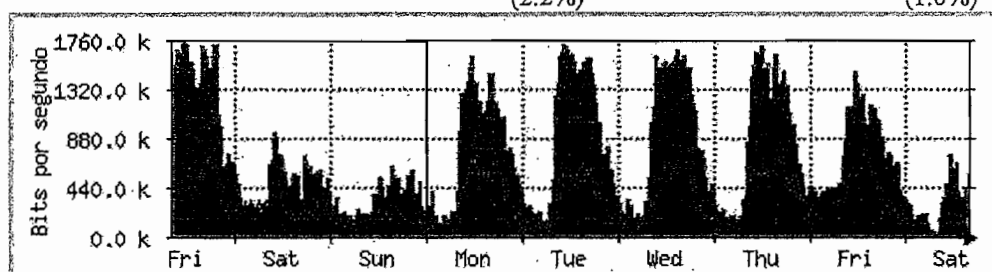


Figura A-2: Perfil de tráfico de referencia

Las horas pico ocurren entre las 10h00 y 12h00 y entre las 15h00 hasta las 18h00. En la Figura A-3 se muestra información que caracteriza el perfil de tráfico como es la cantidad de usuarios conectados y las aplicaciones que utilizan, la cantidad de usuarios esta basada en las direcciones IP que utilizan una aplicación en el lapso de un minuto.

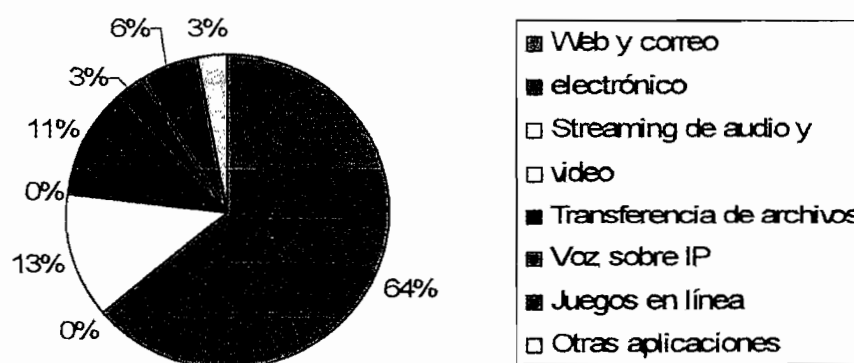


Figura A-3: Aplicaciones utilizadas

SDI_R_FALL_F_S_P

DESCONEXIONES DE PRIMARIOS DE DISTRIBUCION

Fecha 2005/03/15 MARTES

S/E	Prim	KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(28) IÑAQUITO	C	6,3	11:15	12:20	AUTOMATICA	386 409 403	4 3	4 49	51G

11:32 HORAS TENTATIVA PARA RESTABLECER EL SERVICIO. NO CONECTA EL PRIMARIO (51G).
 11:55 TENTATIVA PARA RESTABLECER EL SERVICIO. SR. L. ALDAZ ABRE CORTE VISIBLE SB3 SHYRIS ACERA ORIENTAL Y NACIONES UNIDAS ACERA SUR. CONECTA EL PRIMARIO. SE DESCONECTA MANUALMENTE EL DISYUNTOR.
 TENTATIVA PARA RESTABLECER EL SERVICIO SRA3 DE LA IRLANDA Y 6 DE DICIEMBRE QUEMADOS LOS 3 FUSIBLES DE MEDIA TENSION. CIERRA SB3 SHYRIS Y NACIONES UNIDAS Y SE CONECTA EL PRIMARIO.
 CABLE SUBTERRANEO DE MEDIA TENSION EN MAL ESTADO ENTRE LA IRLANDA Y REPUBLICA DEL SALVADOR Y LA CAMARA DE TRANSFORMACION T-04 DE LA URB. CAROLINA MUNICIPAL. CONOCE SR. L. ALDAZ.

Fecha 2005/03/27 DOMINGO

S/E	Prim	KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(28) IÑAQUITO	A	6,3	19:03	20:25	AUTOMATICA	215 215 215	4 3	4 49	51G

PARARRAYO EN MAL ESTADO "V" TRANSFORMADOR 45 KVA T No. 3930-E EN LA COREA ENTRE IÑAQUITO Y 10 DE AGOSTO. SR. L. CARRERA ANULO EL PARARRAYO Y NORMALIZO EL SERVICIO.

	C	6,3	09:30	10:30	AUTOMATICA	268 268 268	4 3	3 31	50U
--	---	-----	-------	-------	------------	-------------	-----	------	-----

PARTICULARES DE LA EMPRESA LETRASIGMA (CAMION MITSUBISHI BLANCO PWY-981 CONDUCCION POR EL SR. LUIS A. ORTIZ C.I. # 170619490-7) AL INSTALAR LETRERO PROVOCAN CORTOCIRCUITO RED DE MEDIA TENSION EN LA AVENIDA DE LOS SHYRIS Y PORTUGAL. CONOCEN, SUBTANTE EDUARDO RON Y SR. S. GOMEZ.

50V
50W
51U
51V
51W

Fecha 2005/05/16 LUNES

S/E	Prim	KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(28) IÑAQUITO	C	6,3	16:05	16:59	AUTOMATICA	363 386 389	4 3	0 1	51G

16:13 HORAS TENTATIVA PARA RESTABLECER EL SERVICIO. NO CONECTA EL PRIMARIO (50U, 50W, 51G).
 DESCARGAS ATMOSFERICAS. SR. B. GONZALEZ ANULO 2 PARARRAYOS ESTALLADOS ACOMETIDA SUBTERRANEA DE MEDIA TENSION EDIFICIOS TAMMAYO Y LA TRIBUNA EN LA PORTUGAL Y SHYRIS.
 SR. P. MORETA COLABORO EN LA SUBESTACION IÑAQUITO (28).

Fecha 2005/05/17 MARTES

S/E	Prim	KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(28) IÑAQUITO	A	6,3	09:10	09:45	AUTOMATICA	311 311 315	4 3	3 31	50G

DE EDIFICIO EN CONSTRUCCION DE LA LONDRES Y ARIZAGA TOPAN ACCIDENTALMENTE CON CABLE DE GRUA LINEA DE MEDIA TENSION. SUMINISTRO 1329416-K. NO EXISTE NOVEDAD CON LAS LINEAS. CONOCE SR. M. RAMIREZ. SR. L. ALDAZ COLABORO PARA LA CONEXION DEL PRIMARIO.



SDI_R_FALL_F_S_P

DESCONEXIONES DE PRIMARIOS DE DISTRIBUCION

Fecha 2005/06/12 DOMINGO

S/E	Prim	KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(28) IÑAQUITO	A	6,3	07:54	07:58	MANUAL	60 60 60	3 2	9 91	
CORRECCION FUGA DE ACEITE Y CHEQUEO SECCIONADOR BY PASS S/E IÑAQUITO. TRABAJO PROGRAMADO ING. O. MERIZALDE O/T 715. SE TRANSFIERE CARGA AL PRIMARIO "C" S/E GRANDA CENTENO (13). SR. R. CANCHIGNIA CERRO SB3 EN LA COREA Y 10 DE AGOSTO LADO ORIENTAL DE LA 10 DE AGOSTO, PREVIA DESCONEXION DEL PRIMARIO "C" S/E GRANDA CENTENO (13). SR. M. INSUASTI COLABORO EN LA SUBESTACION PARA LA DESCONEXION DEL PRIMARIO.									
			13:49	13:52	MANUAL	140 148 160	3 2	9 91	
	B	6,3	07:57	08:05	MANUAL	70 60 60	3 2	9 91	
SR. R. CANCHIGNIA ABRE SB3 EN LA COREA Y 10 DE AGOSTO LADO ORIENTAL DE LA 10 DE AGOSTO. NORMALIZA TRANSFERENCIA DE CARGA CON PRIMARIO "C" S/E GRANDA CENTENO (13). SR. M. INSUASTI CONECTA EL PRIMARIO. TRABAJO PROGRAMADO ING. O. MERIZALDE O/T 715.									
			13:40	13:52	MANUAL	116 125 123	3 2	9 91	
	C	6,3	07:52	07:58	MANUAL	160 200 190	3 2	9 91	
CORRECCION FUGA DE ACEITE Y CHEQUEO SECCIONADOR BY PASS S/E IÑAQUITO. TRABAJO PROGRAMADO ING. O. MERIZALDE O/T 715. SE TRANSFIERE CARGA AL PRIMARIO "A" S/E GRANDA CENTENO (13). SR. W. RUBIO CERRO SB3 EN LA VILLALENGUA Y 10 DE AGOSTO LADO ORIENTAL DE LA 10 DE AGOSTO, PREVIA DESCONEXION DEL PRIMARIO "A" S/E GRANDA CENTENO (13). SR. M. INSUASTI COLABORO EN LA SUBESTACION PARA LA DESCONEXION DEL PRIMARIO.									
			14:10	14:12	MANUAL	140 140 140	3 2	9 91	
	D	6,3	07:38	07:42	MANUAL	80 80 80	3 2	9 91	
SR. R. CANCHIGNIA ABRE SB3 EN LA VILLALENGUA Y 10 DE AGOSTO LADO ORIENTAL DE LA 10 DE AGOSTO. NORMALIZA TRANSFERENCIA DE CARGA CON PRIMARIO "A" S/E GRANDA CENTENO (13). SR. L. ALDAZ METE PUNTAS DE CABLE SUBTERRANEO REPARADO EN LA NACIONES UNIDAS Y JAPON ENTRE EL CCNU Y EDIFICIO CORDIEZ. SR. M. INSUASTI CONECTA EL PRIMARIO. TRABAJO PROGRAMADO ING. O. MERIZALDE O/T 715.									
CORRECCION FUGA DE ACEITE Y CHEQUEO SECCIONADOR BY PASS S/E IÑAQUITO. TRABAJO PROGRAMADO ING. O. MERIZALDE O/T 715. SE TRANSFIERE CARGA AL PRIMARIO "C" S/E OLIMPICO (1). SR. J. TOAPANTA CERRO SB3 CORTE VISIBLE SALIDA DEL PRIMARIO EN LA S/E OLIMPICO (1) QUE SE ENCONTRABA DESCONECTADO. SR. M. INSUASTI COLABORO EN LA SUBESTACION PARA LA DESCONEXION DEL PRIMARIO.									
SR. J. TOAPANTA ABRE SB3 CORTE VISIBLE PRIMARIO "C" S/E OLIMPICO (1). NORMALIZA TRANSFERENCIA DE CARGA CON PRIMARIO "C" S/E OLIMPICO (1). ING. O. MERIZALDE CONECTA EL PRIMARIO. TRABAJO PROGRAMADO ING. O. MERIZALDE O/T 715.									
CORRECCION FUGA DE ACEITE Y CHEQUEO SECCIONADOR BY PASS S/E IÑAQUITO. TRABAJO PROGRAMADO ING. O. MERIZALDE O/T 715. SE TRANSFIERE CARGA AL PRIMARIO "F" S/E CAROLINA (24). SR. L. ALDAZ CERRO SB3 EN LA CAMARA DE TRANSFORMACION DEL CENTRO DE EXPOSICIONES QUITO, PREVIA DESCONEXION DEL PRIMARIO "F" S/E CAROLINA (24). SR. M. INSUASTI COLABORO EN LA SUBESTACION PARA LA DESCONEXION DEL PRIMARIO.									



SDI_R_FALL_F_S_P

DESCONEXIONES DE PRIMARIOS DE DISTRIBUCION

2005/06/12 DOMINGO

(28) IÑAQUITO [D] 6,3 13:55 13:57 MANUAL 237 228 243 3 2 9 91

SR. L. ALDAZ ABRE SB3 EN LA CAMARA DE TRANSFORMACION DEL CENTRO DE EXPOSICIONES QUITO. NORMALIZA TRANSFERENCIA DE CARGA CON PRIMARIO "F" S/E CAROLINA (24). SR. M. INSUASTI CONECTA EL PRIMARIO. TRABAJO PROGRAMADO ING. O. MERIZALDE O/T 715.

Fecha 2005/06/25 SÁBADO

SIE Prim KV Inicio Final Desconexión Amperaje Origen Causa Reles
(28) IÑAQUITO [C] 6,3 15:15 15:20 MANUAL 20 20 20 4 3 9 93

SR. B. GONZALEZ ABRE SB3 PORTUGAL Y SEIS DE DICIEMBRE, LADO SUR DE LA PORTUGAL. SE TRANSFIERE PARTE DE CARGA A LOS PRIMARIOS "A" S/E CAROLINA (24) Y "C" S/E OLIMPICO (01). SECTOR COMPRENDIDO ENTRE LA PORTUGAL, 6 DE DICIEMBRE, ELOY ALFARO Y SHYRIS. SR. W. GRANDA COLABORO EN LA SUBESTACION PARA LA DESCONEXION Y CONEXION DEL PRIMARIO.

Fecha 2005/07/09 SÁBADO

SIE Prim KV Inicio Final Desconexión Amperaje Origen Causa Reles
(28) IÑAQUITO [B] 6,3 08:30 09:00 AUTOMATICA 78 78 69 4 3 8 81

DESCONOCIDA.

50U
50V
50W

Fecha 2005/07/12 MARTES

SIE Prim KV Inicio Final Desconexión Amperaje Origen Causa Reles
(28) IÑAQUITO [D] 6,3 17:55 18:10 AUTOMATICA 300 300 300 4 3 4 49

TRES SECCIONADORES BARRA ESTALLADOS EN CAMARA DE SECCIONAMIENTO DE LA AVENIDA AMAZONAS Y JUAN PABLO SANZ, DERIVACION A LA CAMARA DE TRANSFORMACION DEL BANCO POPULAR. SECCIONADOR ESTALLADO Y FLAMEADO EN LA DERIVACION A LA CAMARA DE TRANSFORMACION DEL EDIFICIO XEROX. TRES EDIFICIOS SIN SERVICIO. TRABAJO PARA RED SUBTERRANEA. CONOCE SR. B. GONZALEZ.

50U
50V
50W
51G
51U
51V
51W
50G
51G

18:23 19:00 AUTOMATICA 300 300 300 4 3 4 49

TRES SECCIONADORES BARRA ESTALLADOS CAMARA DE SECCIONAMIENTO DE LA AVENIDA AMAZONAS Y JUAN PABLO SANZ DERIVACION A LA CAMARA DE TRANSFORMACION DEL BANCO POPULAR. SECCIONADOR ESTALLADO Y FLAMEADO EN LA DERIVACION A LA CAMARA DE TRANSFORMACION DEL EDIFICIO XEROX. SR. B. GONZALEZ ANULO LAS BAJADAS EN LA CAMARA DE SECCIONAMIENTO Y SE NORMALIZO EL SERVICIO. ES NECESARIO REVISAR RED SUBTERRANEA MT, CAMBIAR LOS SECCIONADORES. QUEDAN AFECTADOS LOS EDFs. XEROX, ANTIZANA 1 Y AMAZONAS 4000.

SDL_R_FALL_F_S_P

DESCONEXIONES DE PRIMARIOS DE DISTRIBUCION

Fecha 2005/07/13 MIÉRCOLES

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(28) IÑAQUITO	A 6,3	07:45	08:10	MANUAL	190 187 181	4 3	9 91	

RS1 CAMBIO DOS CAJAS DE MEDIA TENSION EN MAL ESTADO EN LA CAMARA DE TRANSFORMACION DEL PARQUE LA CAROLINA FRENTE AL BANCO CENTRAL EN LA AVENIDA AMAZONAS Y JUAN PABLO SANZ Y NORMALIZO EL SERVICIO. CONOCEN SRS. L. ALDAZ Y T. IZA.

Fecha 2005/07/21 JUEVES

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(28) IÑAQUITO	D 6,3	06:30	06:40	MANUAL	100 100 100	4 3	4 51	

POR SEGURIDAD. RS1 METE RM6 EN CAMARA DE TRANSFORMACION AMAZONAS Y JUAN PABLO SANZ. CONOCEN SRS. L. ALDAZ Y T. IZA.

Fecha 2005/07/23 SÁBADO

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(28) IÑAQUITO	D 6,3	08:51	08:53	MANUAL	256 256 265	4 3	9 90	

SR. M. PUPIALES ABRE SB3 EN POSTE DE LA AMAZONAS Y JAPON. INSTALACION RM6. TRABAJO PROGRAMADO ING. F. VALDIVIESO O/T 11471-01. SR. L. ALDAZ COLABORO EN LA SUBESTACION PARA LA DESCONEXION Y CONEXION DEL PRIMARIO.

Fecha 2005/10/01 SÁBADO

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(28) IÑAQUITO	A 6,3	08:15	08:50	MANUAL	120 120 120	4 3	9 91	

LE1 REMENDO LINEA DE MEDIA TENSION ROTA "W" EN EL BOTE DE LA ACOMETIDA SUBTERRANEA DE ORVE HOGAR EN LA NACIONES UNIDAS Y AMAZONAS. PERSONAL DE RED SUBTERRANEA COLABORO EN LA SUBESTACION IÑAQUITO (28) PARA LA CONEXION Y DESCONEXION DEL PRIMARIO. CONOCEN SRS. L. ALDAZ Y SR. J. CASTELLANOS.

Fecha 2005/10/23 DOMINGO

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(28) IÑAQUITO	C 6,3	08:08	08:10	MANUAL	90 90 90	4 3	9 93	

SR. W. LOPEZ CIERRA SB3 PORTUGAL LADO SUR Y AVENIDA 6 DE DICIEMBRE LADO OCCIDENTAL. RECIBE PARTE DE CARGA DEL PRIMARIO "C" S/E OLIMPICO (01). TRABAJO PROGRAMADO ING. F. JAMI O/T 11807-01 SR. PATRICIO PANCHI COLABORO EN LA SIBESTACION PARA LA DESCONEXION Y CONEXION DEL PRIMARIO. 16:55 16:58 MANUAL 100 100 100 4 3 9 93

SR. S. GOMEZ ABRE SB3 PORTUGAL LADO SUR Y 6 DE DICIEMBRE LADO OCCIDENTAL. NORMALIZA TRANSFERENCIA DE CARGA PRIMARIO "C" S/E OLIMPICO (01). TRABAJO PROGRAMADO ING. F. JAMI O/T 11807-01. SR. P. PANCHI COLABORO EN LA SUBESTACION PARA LA DESCONEXION Y CONEXION DEL PRIMARIO.

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DESCONEXIONES DE PRIMARIOS DE DISTRIBUCION

Fecha 2005/11/02 MIÉRCOLES

SIE	Prim	KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(28) IÑAQUITO	C	6,3	13:15	14:03	AUTOMATICA	120 120 120	4 3	4 49	51G

CAJA DE MEDIA TENSION TIPO BARRA "V" EN MAL ESTADO EN SB3 BOTE SUBTERRANEO CAMARA DE TRANSFORMACION DE LA NACIONES UNIDAS Y SHIRYS. SR. H. PEREZ PUENTE LA CAJA . URGENTE EL CAMBIO, TRABAJO PARA LINEAS ENERGIZADAS.
15:28 15:31 MANUAL 170 180 180 4 3 9 91

SR. W. RUBIO CAMBIO FUBLE DE MEDIA TENSION 65 A "U" EN SF3 BOTE SUBTERRANEO DE MEDIA TENSION SHIRYIS Y SUECIA.

Fecha 2005/11/21 LUNES

SIE	Prim	KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(28) IÑAQUITO	C	6,3	23:56	00:30	MANUAL	50 75 80	4 3	9 91	

SR. W. RUBIO REFORZO LINEA DE MEDIA TENSION Y CAMBIO CONECTOR BAJADA FASE "U" SB3 SUECIA Y FINLANDIA.

Fecha 2005/12/23 VIERNES

SIE	Prim	KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(28) IÑAQUITO	B	6,3	12:55	13:55	AUTOMATICA	216 216 207	4 3	8 81	51G

DESCONOCIDA.



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DESCONEXIONES DE PRIMARIOS DE DISTRIBUCION

Fecha 2005/03/03 JUEVES

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(24) CAROLINA	A 6,3	18:20	18:23	AUTOMATICA	306 316 308	4 3	8 81	50U 50W 51U 51W

DESCONOCIDA.

Fecha 2005/03/07 LUNES

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(24) CAROLINA	O 6,3	10:58	11:38	AUTOMATICA	1763 1745 1758	3 2	3 32	27

GRUA DEL MUNICIPIO DE QUITO AL RETIRAR POSTES DE PORTA EN LA MARIANO AGUILERA Y PRADERA PROVOCA CORTOCIRCUITO LINEA DE 46 KV S/E VICENTINA - S/E CAROLINA (24) - S/E LA FLORESTA (12). DESCONEXION AUTOMATICA DISYUNTORES S10, S40 Y S50 EN 46 KV S/E VICENTINA Y DEL TRANSFORMADOR T2 DE 100 MVA EN LA S/E VICENTINA. CONOCE ING. F. RIVERA.

Fecha 2005/03/17 JUEVES

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(24) CAROLINA	E 6,3	02:13	02:19	AUTOMATICA	198 166 166	4 3	3 35	51U

TENSOR DE MEDIA TENSION CHOCADO POR VEHICULO AUDI NEGRO PLACAS PYD-516 EN LA WHIMPER SECTOR DE LA IGLESIA DE LA PAZ. ES NECESARIO REPONER EL TENSOR, REGULAR RED DE BT Y CORTAR RAMAS CERCA DE LAS REDES. CAUSANTE LLEVADO A LA REVISION. CONOCE SR. L. CARRERA.

03:59 04:01 MANUAL 157 128 128 4 3 9 91

SR. L. CARRERA CAMBIO FUSIBLE DE MEDIA TENSION 100A "U" EN SF3 DE LA WHIMPER JUNTO AL EDIFICIO PAUL RIVET. FUSIBLE QUEMADO A CAUSA DE CHOQUE DE VEHICULO CONTRA TENSOR.

Fecha 2005/03/31 JUEVES

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(24) CAROLINA	D 6,3	16:55	17:00	MANUAL	270 274 266	4 3	9 93	

SR. P. RODRIGUEZ ABRE SB3 DE LA DIEGO DE ALMAGRO Y ORELLANA, LADO SUR DE LA ORELLANA. POR PEDIDO DE DESPACHO DE POTENCIA SE TRANSFIERE PARTE DE CARGA AL PRIMARIO "E" S/E PEREZ GUERRERO (53). CONOCE ING. F. RIVERA.

Fecha 2005/04/25 LUNES

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(24) CAROLINA	O 6,3	15:12	15:40	AUTOMATICA	1542 1526 1533	3 2	3 31	27

DESCONEXION AUTOMATICA DISYUNTORES S-40 EN 46 KV EN LA S/E VICENTINA Y DISYUNTOR 7 EN 46 KV S/E NORTE, LINEA 46 KV S/E VICENTINA - S/E NORTE. PERSONAL DE TV CABLE TOPA CON ANTENA LINEA DE 46 KV EN LA CALLE

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DESCONEXIONES DE PRIMARIOS DE DISTRIBUCION

Fecha 2005/04/28 JUEVES

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(24) CAROLINA	B 6,3	13:15	13:27	AUTOMATICA	406 400 392	4 3	0 1	50G 51G
DESCARGAS ATMOSFERICAS. SR. W. RUBIO COLABORO PARA LA CONEXION DEL PRIMARIO.								
	D 6,3	13:15	13:27	AUTOMATICA	397 397 302	4 3	0 1	50G 51G
DESCARGAS ATMOSFERICAS. SR. W. RUBIO COLABORO PARA LA CONEXION DEL PRIMARIO.								
		14:20	14:27	MANUAL	45 45 50	4 3	9 91	
LE1 CAMBIO AISLADORES DE SUSPENSION ESTALLADOS "U" Y "W" EN LA ORELLANA Y 6 DE DICIEMBRE. CONOCE SR. J. CASTELLANOS.								

Fecha 2005/06/12 DOMINGO

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(24) CAROLINA	F 6,3	07:39	07:42	MANUAL	42 40 42	4 3	9 93	
SR. L. ALDAZ CIERRA SB3 EN LA CAMARA DE TRANSFORMACION DEL CENTRO DE EXPOSICIONES QUITO. RECIBE CARGA DEL PRIMARIO "D" S/E I?AQUITO (28). TRABAJO PROGRAMADO ING. O. MERIZALDE O/T 715.								
		13:55	13:56	MANUAL	149 141 140	4 3	9 93	
SR. L. ALDAZ ABRE SB3 EN LA CAMARA DE TRANSFORMACION DEL CENTRO DE EXPOSICIONES QUITO. NORMALIZA TRANSFERENCIA DE CARGA CON EL PRIMARIO "D" S/E I?AQUITO (28). TRABAJO PROGRAMADO ING. O. MERIZALDE O/T 715.								

Fecha 2005/06/25 SÁBADO

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(24) CAROLINA	A 6,3	14:17	14:19	MANUAL	209 206 199	4 3	4 51	
POR SEGURIDAD. SR. J. CASTELLANOS CIERRA SB3 SHYRIS Y ELOY ALFARO, LADO SUR DE LA ELOY ALFARO. PONE TENSION EQUIPO RM6 UBICADO EN LA PLAZA ARGENTINA.								
		15:19	15:21	MANUAL	197 191 191	4 3	9 90	
SR. B. GOZALEZ CIERRA SB3 6 DE DICIEMBRE Y CHECOSLOVAQUIA Y ABRE SB3 SHYRIS Y ELOY ALFARO, LADO NORTE DE LA ELOY ALFARO. SE TRANSFIERE CARGA AL PRIMARIO "C" S/E OLIMPICO (01). SECTOR COMPRENDIDO ENTRE LA PORTUGAL, 6 DE DICIEMBRE, ELOY ALFARO Y SHYRIS. SE DESCARGA EL PRIMARIO "A" S/E CAROLINA (24) PARA SERVIR CABINA DEL RM6 DEL PARQUE ARGENTINA Y DOS CAMARAS DE TRANSFORMACION DE LOS TUNELES DE LA INTEROCEANICA.								

Fecha 2005/07/23 SÁBADO

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(24) CAROLINA	F 6,3	08:20	08:22	MANUAL	66 64 70	4 3	9 90	

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DESCONEXIONES DE PRIMARIOS DE DISTRIBUCION

2005/07/23 SÁBADO

(24) CAROLINA F 6,3 08:20 08:22 MANUAL 66 64 70 4 3 9 90

SR. L. ALDAZ ABRE SB3 EN POSTE DERIVACION A CAMARA DE TRANSFORMACION DE LA AMAZONAS Y REPUBLICA .
INSTALACION RM6. TRABAJO PROGRAMADO ING. F. VALDIVIESO O/T 11471-01.

15:38 15:45 AUTOMATICA 129 127 132 4 3 4 54

ES NECESARIO REVISAR RELES ACTUADOS EN LA SUBESTACION. ERROR EN OPERACION DEL RM6 DE LA AMAZONAS
Y RUMIPAMBA PROVOCA LA DESCONEXION DEL PRIMARIO. CONOCE SR. L. ALDAZ.

Fecha 2005/07/26 MARTES

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(24) CAROLINA	E 6,3	12:24	12:30	AUTOMATICA	373 379 379	4 3	1 18	

SIN SE?ALIZACION. ARBOL SOBRE RED DE MEDIA TENSION EN LA JIMENEZ DE LA ESPADA Y GONZALEZ SUAREZ.
LINEA DE MEDIA TENSION ROTA. CONOCEN SRS. L. ALDAZ Y H. PEREZ.

13:15 13:16 MANUAL 353 356 356 4 3 9 91

SR. H. PEREZ ABRE SB3 DE LA CORU?A Y HUMBOLDT PARA RETIRAR RAMAS DE ARBOL SOBRE RED DE MEDIA
TENSION Y REMENDAR Y REGULAR LINEA DE MEDIA TENSION ROTA EN LA JIMENEZ DE LA ESPADA Y GONZALEZ
SUAREZ.

15:53 15:55 MANUAL 253 258 258 4 3 9 91

SR. J. PULGAR CIERRA SB3 DE LA CORU?A Y HUMBOLDT NORMALIZA SERVICIO.

22:02 22:11 MANUAL 254 256 256 4 3 9 91

SR. J. PULGAR REHIZO BAJADA DE DIA TENSION SUELTA "U" ACOMETIDA SUBTERRANEA EDIFICIO BELVEDERE EN LA
JIMENEZ DE LA ESPADA Y GONZALEZ SUAREZ. (CONSECUENCIA DE LA CAIDA DEL ARBOL).

Fecha 2005/09/19 LUNES

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(24) CAROLINA	B 6,3	07:31	07:34	AUTOMATICA	215 205 207	4 3	8 81	50U

DESCONOCIDA. 50W 51U

Fecha 2005/10/21 VIERNES

SIE	Prim KV	Inicio	Final	Desconexión	Amperaje	Origen	Causa	Reles
(24) CAROLINA	D 6,3	15:49	16:45	AUTOMATICA	169 169 169	4 3	0 1	50G

DESCARGAS ATMOSFERICAS. 50U

16:01 HORAS TENTATIVA PARA RESTABLECER EL SERVICIO (SCADA). NO CONECTA EL PRIMARIO. 50V

SR. B. GONZALEZ REALIZA RECORRIDO Y NO ENCUENTRA NOVEDAD. CONECTA EL PRIMARIO. ENECONTR

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DESCONEXIONES DE PRIMARIOS DE DISTRIBUCION

2005/10/21 VIERNES

(24) CAROLINA	D	6,3	15:49	16:45	AUTOMATICA	169	169	169	4	3	0	1	50W
DESCARGAS ATMOSFERICAS.													
16:01 HORAS TENTATIVA PARA RESTABLECER EL SERVICIO (SCADA). NO CONECTA EL PRIMARIO.													
SR. B. GONZALEZ REALIZA RECORRIDO Y NO ENCUENTRA NOVEDAD. CONECTA EL PRIMARIO. ENECONTRO													
DESCONECTADO RECONECTADOR R-216 DE LA PRADERA Y PROLONGACION DE LA MARIANA DE JESUS. REALIZA													
UNA TENTATIVA DE CONEXION DEL RECONECTADOR. NO CONECTA EL EQUIPO. REvisa CAMARAS Y CONECTA EL R-													
216 A LAS 19:30. ES NECESARIO REVISAR CONECTORES DE MEDIA TENSION "V" EN EL RECONECTADOR. TRABAJO													
PARA LINEAS ENERGIZADAS.													
E	6,3	15:49	16:00	AUTOMATICA	370	381	381	4	3	0	1	50G	
DESCARGAS ATMOSFERICAS.													
50U													
50V													
50W													
51G													
51U													
51V													
51W													

Fecha 2005/10/23 DOMINGO

S/E	Prím	KV	Inicio	Final	Desconexión	Amperaje			Origen		Causa	Reles	
(24) CAROLINA	A	6,3	08:25	08:29	MANUAL	85	86	85	4	3	9	93	
SR. W. LOPEZ CIERRA SB3 AVENIDA ELOY ALFARO LADO ORIENTAL Y AVENIDA DE LOS SHYRIS LADO NORTE. RECIBE CARGA DEL PRIMARIO "D" S/E OLIMPICO Y PARTE DEL "C" S/E OLIMPICO (01). TRABAJO PROGRAMADO ING. F. JAMI O/T 11807-01.													
			11:27	11:40	MANUAL	329	331	336	4	3	9	91	
SR. TELMO IZA CAMBIO SECUENCIA DE FASES EN MEDIA TENSION EN CRUCE SUBTERRANEO AVENIDA 6 DE DICIEMBRE LADO ORIENTAL E IGNACIO BOSSANO.													
			16:37	16:40	MANUAL	90	84	81	4	3	9	93	
SR. S. GOMEZ ABRE SB3 ELOY ALFARO LADO ORIENTAL Y SHYRIS LADO NORTE, ABRE SB3 6 DE DICIEMBRE LADO OCCIDENTAL Y BOSSANO LADO SUR. NORMALIZA TRANSFERENCIA DE CARGA PRIMARIO "D" S/E LIMPICO (01) Y PARTE DEL PRIMARIO "C" S/E /OLIMPICO. TRABAJO PROGRAMADO ING. F. JAMI O/T 11807-01.													

Fecha 2005/10/29 SÁBADO

S/E	Prím	KV	Inicio	Final	Desconexión	Amperaje			Origen		Causa	Reles
(24) CAROLINA	E	6,3	09:58	10:40	MANUAL	278	277	270	4	3	9	91

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DESCONEXIONES DE PRIMARIOS DE DISTRIBUCION

2005/10/29 SÁBADO

(24) CAROLINA	E	6,3	09:58	10:40	MANUAL	278	277	270	4	3	9	91
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SR. B. GONZALEZ REHIZO EMPALME AEREO DE MEDIA TENSION EN MAL ESTADO "V" EN LA GONZALEZ SUAREZ Y JIMENEZ DE LA ESPADA.

Fecha 2005/12/24 SÁBADO

S/E	Prim	KV	Inicio	Final	Desconexión	Amperaje			Origen		Causa	Reles
(24) CAROLINA	C	6,3	05:20	06:10	AUTOMATICA	39	37	38	4	3	3	35

POSTE DE HORMIGON CON REDES DE MEDIA TENSION (PRIMARIOS "C" Y "F" S/E CAROLINA (24)) CHOCADO POR PEUGEOT PLOMO PLACAS PRK-678 EN LA AVENIDA REPUBLICA Y AMAZONAS FRENTE AL CENTRO COMERCIAL EL JARDIN. POSTE ROTO. URGENTE EL CAMBIO. CAUSANTE DEJA CHEQUE EN GARNTIA POR 3.000,00 DOLARES. CONOCE SR. B. GONZALEZ. GRUPO RA3 DE CONSTRUCCION DE REDES CAMBIO EL POSTE. CONOCEN INGS. G. BRAVO Y J. MAYA Y SRS. V. MOROCHO Y B. GONZALEZ.

09:35	12:13	MANUAL	86	80	91	4	3	9	91
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GRUPO RA3 DE CONSTRUCCION DE REDES CON LA COLABORACION DE SRS. OPERADORES DEL CENTRO CAMBIARON POSTE CHOCADO CON REDES DE MEDIA TENSION EN LA AVENIDA REPUBLICA Y AMAZONAS FRENTE AL MALL EL JARDIN. CONOCEN INGS. G. BRAVO Y J. MAYA Y SRS. V. MOROCHO Y B. GONZALEZ.

F	6,3	05:20	06:10	AUTOMATICA	44	40	41	4	3	3	35
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POSTE DE HORMIGON CON REDES DE MEDIA TENSION (PRIMARIOS "C" Y "F" S/E CAROLINA (24)) CHOCADO POR PEUGEOT PLOMO PLACAS PRK-678 EN LA AVENIDA REPUBLICA Y AMAZONAS FRENTE AL CENTRO COMERCIAL EL JARDIN. POSTE ROTO. URGENTE EL CAMBIO. CAUSANTE DEJA CHEQUE EN GARNTIA POR 3.000,00 DOLARES. CONOCE SR. B. GONZALEZ. GRUPO RA3 DE CONSTRUCCION DE REDES CAMBIO EL POSTE. CONOCEN INGS. G. BRAVO Y J. MAYA Y SRS. V. MOROCHO Y B. GONZALEZ.

09:35	12:13	MANUAL	106	100	104	4	3	9	91
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GRUPO RA3 DE CONSTRUCCION DE REDES CON LA COLABORACION DE SRS. OPERADORES DEL CENTRO CAMBIARON POSTE CHOCADO CON REDES DE MEDIA TENSION EN LA AVENIDA REPUBLICA Y AMAZONAS FRENTE AL MALL EL JARDIN. CONOCEN INGS. G. BRAVO Y J. MAYA Y SRS. V. MOROCHO Y B. GONZALEZ.

CONDICIONES ESPECÍFICAS DE LOS SERVICIOS DE ACCESO A INTERNET IBERDROLA (ADSL y PLC)

1.- Objeto.

1.1 Las presentes Condiciones específicas regulan la prestación Por Iberdrola, S.A. en colaboración con Neosky 2002, S.A., de los siguientes servicios:

- Acceso a Internet (A.I.) de alta velocidad mediante tecnología "ADSL", denominado Servicio de Acceso a Internet ADSL.

- ACCESO a Internet (A.I.) de alta velocidad mediante tecnología "Power Line Communication", (PLC), denominado Servicio de Acceso a Internet PLC.

1.2 Características de los servicios contratados:

- ADSL: Acceso a Internet con conexión permanente, tarifa plana sin horario, sin limitación de tráfico enviado o recibido, basado en tecnología de bucle de abonado digital ADSL, sobre la línea telefónica (RTC o RDSI) suministrada por un operador de red telefónica (en adelante, el "Operador de Red Telefónica"). El caudal máximo no garantizado de recepción/envío es de 256/128 Kbps, 512/128 Kbps, 1024/300 Kbps ó 2048/300 Kbps según la opción de servicio seleccionada por el cliente en el Contrato. El servicio se presta con filtrado distribuido y direccionamiento IP dinámico. El Anexo I se incorpora las características técnicas del servicio contratado.

El servicio ADSL contratado es compatible con el servicio telefónico sobre RTC o RDSI de forma simultánea, no formando éste parte del servicio.

- PLC: Acceso a Internet con conexión permanente, tarifa plana sin horario, sin limitación de tráfico enviado o recibido, basado en tecnología de comunicación PLC. El caudal máximo no garantizado de recepción /envío es de 100/100 Kbps o 600/600 Kbps según la opción de servicio seleccionada por el cliente en el contrato. Iberdrola cederá un "modem PLC" , que el cliente deberá conservar y devolver, a la conclusión del contrato. El servicio se presta con direccionamiento IP dinámico. En Anexo II se incorporan las características técnicas del servicio contratado.

El Servicio PLC es independiente y compatible con el suministro eléctrico de forma simultánea, no formando éste parte del servicio.

1.3. Iberdrola, a solicitud del cliente, prestará los siguientes servicios de valor añadido que tendrán carácter gratuito para el cliente:

- Servicio de valor añadido de correo electrónico: Hasta 5 cuentas POP3 de 25 Megabytes cada una, bajo dominio propuesto por Iberdrola, que el cliente podrá ampliar previo acuerdo.

- Servicio de valor añadido de alojamiento de página web de 10 Megabytes para página personal bajo dominio propuesto por Iberdrola, con un consumo máximo de tasa de transferencia (ancho de banda) de UN (1) Megabyte por página vista.

Iberdrola podrá modificar o suprimir la prestación de los servicios adicionales y de valor añadido, debiendo comunicarlo al cliente con un pre aviso de quince (15) días.

Las partes podrán convenir en el futuro nuevos servicios de valor añadido a los precios que se acuerden.

1.4. El cliente podrá solicitar el traslado o cambio de configuración de los servicios previa aceptación de un presupuesto y contrastada su viabilidad técnica. Iberdrola podrá, con un pre aviso de quince (15) día, modificar los parámetros de los servicios de valor añadido, así como de tiempo de borrado de mensajes.

1.5. Las partes convienen en que, para el normal desarrollo de los contratos objeto de las presentes Condiciones Específicas, el medio de comunicación de Iberdrola con el cliente será la remisión de mensajes a su buzón de correo electrónico o mediante el teléfono de Atención al Clientes 901 20 20 20.

1.6. La aplicación y validez de las presentes Condiciones Específicas de contratación y del contrato unido a las mismas quedará condicionada a una verificación real de cobertura para el emplazamiento en concreto y verificación de la viabilidad técnica de la solicitud.

1.7. Los Servicios de Acceso a Internet ADSL y PLC de Iberdrola se prestan al cliente en calidad de usuario final, para su uso exclusivo de el domicilio de instalación indicado en el proceso de contratación, quedando prohibida expresamente cualquier actuación de reventa o distribución de los servicios a terceros o su utilización fuera del domicilio de instalación.

2.- Precio de los servicios.

2.1. El importe de los servicios se estructura en los siguientes conceptos:

- a) Cuota de Alta inicial, a abonar en un único pago en la primera factura, según el importe reflejado en el contrato.
- b) Cuota Mensual, abonada por meses anticipados, según el importe reflejado en el contrato y según los demás servicios que en el futuro puedan contratarse.
- c) Equipos de Conexión, Elementos de Filtrado y otro equipamiento informático:
El precio de los equipos que Iberdrola pone a disposición del cliente por la contratación de los Servicios de Acceso a Internet será el reflejado en el contrato con las promociones y descuentos allí establecidos. El pago se producirá de una sola vez, conjuntamente con la primera cuota fija mensual.
- d) Instalación en casa del cliente, según los importes que se comuniquen previamente.
- e) Atención de incidencias en casa de cliente(cuando no sea imputable a Iberdrola) según los precios vigentes en cada momento.

2.2. A dichos precios les serán de aplicación los impuestos y otros tributos vigentes en cada momento. a revisión de precios se hará en función de las modificaciones sufridas por los precios vigentes en el mercado, y serán comunicadas al cliente, con al menos quince (15) días de antelación a su entrada en vigor.

3.- Calidad de los servicios.

Iberdrola se compromete a mantener un servicio permanente de acceso a Internet, entregado en el equipo informático del cliente, de veinticuatro horas durante todo el año, con las siguientes limitaciones:

No constituirá incumplimiento contractual los tiempos de interrupción del servicio, cuya causa sea: a) la interrupción del suministro eléctrico o telefónico, o la desconexión del Centro de Transformación (C.T.) con tecnología PLC; b) las operaciones de mantenimiento de la red, tanto eléctrica como telefónica y del equipamiento del PLC, previamente comunicadas al cliente con una antelación de 48 horas; c) las averías producidas en las instalaciones privadas del cliente y d) los supuestos de fuerza mayor, de caso fortuito y la acción de terceros.

Iberdrola no se hace responsable de a) las aplicaciones o servicios que no le hayan sido contratados ni de las consecuencias por la incorporación del cliente de hardware o software que dificulten el acceso a Internet; b) la existencia de virus o de cualquier otro elemento procedente de la red que pueda perturbar los equipos o la operatividad del cliente; c) las manipulaciones que el cliente pudiera hacer en los equipos y en el software cedido por Iberdrola Y d) la afección del software o del hardware PLC en los programas introducidos en el equipo informático del cliente; 4) las deficiencias originadas por el Operador de Acceso, en el ADSL.

Iberdrola responderá por la falta de disponibilidad del servicio cuando se deba a una causa que le sea directamente imputable. Cuando la falta de disponibilidad del servicio se deba a causa no imputable a Iberdrola, esta responderá únicamente en el caso de que la indisponibilidad supere las 48 horas de forma continua o intermitente, en el mismo mes natural, computándose la falta desde el aviso del cliente hasta el momento de su solución.

En caso de responsabilidad de Iberdrola ésta se obliga a devolver al cliente la cantidad equivalente a aquella parte de la cuota mensual que se corresponda con el tiempo de interrupción que exceda de 48 horas.

Esta es la única compensación que Iberdrola se obliga a satisfacer al cliente por los daños y perjuicios, de cualquier naturaleza, que pueda sufrir como consecuencia de la indisponibilidad del servicio.

Si, por causas no imputables a Iberdrola, debiera desplazarse personal de su dependencia, ésta tendrá derecho a facturar la salida e intervención de sus dependientes, según las tarifas previamente notificadas.

Los equipos aportados por Iberdrola tendrán a garantía que refleje el fabricante en a documentación aportada por los mismos.

4.- Condiciones de uso de los servicios contratados y responsabilidades.

4.1. Comunicaciones: Iberdrola no será responsable de los fallos que pudieran producirse en las comunicaciones, incluido el borrado, transmisión incompleta o retrasos en a remisión, no comprometiéndose tampoco a que la red de transmisión esté operativa en todo momento.

4.2.- Privacidad y seguridad en la utilización de los servicios: Iberdrola no garantiza la privacidad y la seguridad en la utilización de los servicios por parte de los clientes, y en particular no garantiza que terceros no autorizados no puedan tener conocimiento de la clase, condiciones, características y circunstancias del uso de Internet que puedan hacer los clientes o que los terceros no puedan acceder y, en su caso, interceptar, eliminar, alterar, modificar, utilizar para la remisión de virus informáticos o manipular de cualquier modo los contenidos y comunicaciones de toda clase que los clientes transmitan, difundan, almacenen, pongan a disposición, reciban, obtengan o accedan a través de los servicios. Iberdrola excluye toda responsabilidad por los daños y perjuicios de cualquier naturaleza que puedan deberse al conocimiento que puedan tener los terceros de la clase, condiciones, características y circunstancias del uso de Internet que puedan hacer los usuarios o que puedan deberse a acceso y, en su caso, a la interceptación, eliminación, alteración, modificación o manipulación de cualquier modo de los contenidos y comunicaciones de toda clase que los usuarios transmitan, difundan, almacenen, pongan a disposición, reciban, obtengan o accedan a través de los servicios.

4.3.- Datos personales: Iberdrola ha adoptado todas las medidas de seguridad legalmente exigidas para la protección de los datos personales suministrados por el cliente. No obstante Iberdrola no puede garantizar la invulnerabilidad absoluta de sus sistemas de seguridad, ni puede garantizar la seguridad o inviolabilidad de dichos datos en su transmisión a través de la red. Igualmente, Iberdrola no garantiza la veracidad o la vigencia de los datos suministrados por el cliente.

4.4.- Infallibilidad: Iberdrola no controla ni garantiza la infallibilidad del servicio o de la ausencia de virus en los contenidos transmitidos, difundidos, almacenados, recibidos, obtenidos, puestos a disposición, o accesibles a través de los servicios, ni la ausencia de otros elementos que puedan producir alteraciones en el equipo informático del cliente o en los documentos electrónicos y ficheros almacenados o transmitidos desde el equipo informático del Cliente. Iberdrola excluye cualquier responsabilidad por los daños y perjuicios de toda naturaleza que puedan deberse a la presencia de virus o a la presencia de otros elementos lesivos en los contenidos transmitidos, difundidos, almacenados, recibidos, obtenidos, puestos a disposición, o accesibles a través de los servicios.

4.5.- Utilidad: Los equipos de acceso que Iberdrola pone a disposición de los clientes tienen por único objeto facilitar a los mismos la búsqueda de la información disponible en Internet. Iberdrola no garantiza que el servicio sea adecuado para la realización de ningún servicio más allá del que se contrata ni que permita acceso a todos los sitios de Internet. Iberdrola no ofrece ni comercializa los productos y servicios disponibles en los sitios enlazados ni asume responsabilidad alguna por tales productos o servicios.

4.6.- Utilización y Contenidos: Iberdrola, que actúa exclusivamente como prestador de un servicio, no controla el uso que de los servicios contratados realiza el cliente. En tal sentido, Iberdrola no se hace responsable del uso y/o de los contenidos que en contravención a las leyes o a las presentes Condiciones Específicas, el cliente pueda hacer del mismo, siendo el cliente el único responsable de las consecuencias que su utilización ilícita o contraria a estas condiciones pudiera tener así como de la veracidad y/ o licitud de los contenidos desplegados.

En el caso de que Iberdrola descubriera, bien de forma directa o través de notificaciones o requerimientos de terceros, la existencia de contenidos que pudieran infringir la legalidad vigente o las presentes Condiciones Específicas o la utilización con fines fraudulentos, ilícitos y / o no autorizados del Servicio de Acceso a Internet, incluidos los servicios adicionales y de valor añadido, Iberdrola se reserva el derecho de suspender por sí misma total o parcialmente el Servicio de Acceso a Internet, incluidos los servicios adicionales y de valor añadido, sin necesidad de autorización previa del cliente, mediante la eliminación de los contenidos infractores o cualquier otra medida que considere necesaria para evitar la continuidad de la comisión del ilícito o de la infracción detectada.

Sin perjuicio de lo anterior, Iberdrola se reserva la facultad de poner en conocimiento de las autoridades administrativas o judiciales aquellos hechos que pudieran ser constitutivos de una actividad ilícita, sin necesidad de comunicarlo previamente al cliente.

4.7.- Limitación de responsabilidad: En todo caso, la responsabilidad de Iberdrola (salvo que concurra dolo o negligencia grave), estará limitada al montante total de cuotas efectivamente pagadas por el cliente en virtud del presente contrato, excluyéndose expresamente toda responsabilidad por daños directos o indirectos, daño emergente y/o lucro cesante.

4.8.- Cuentas de Correo Electrónico: Las cuentas de correo electrónico se gestionan a través de la herramienta de administración delegada vía web con acceso mediante código.

El Correo Electrónico es accesible a través de protocolo SMTP, POP3, y HTTP.

El acceso al servicio se realizará mediante un identificador (ID) o nombre de usuario con el que se identifica su Correo con el dominio asignado por Iberdrola y de una contraseña o password. El identificador y la contraseña serán elegidos por el cliente, con las limitaciones previstas en las Condiciones Generales.

El cliente queda obligado a custodiar la contraseña. Queda prohibida la inclusión de denominaciones malsonantes, ofensivas, indecorosas o que muevan a confusión sobre personas o marcas, a juicio exclusivo de Iberdrola, quien podrá pedir al cliente su modificación en cualquier momento, siempre que exista causa razonada para ello, así como la unificación de los diversos identificadores que tuviera en los distintos servicios para mantener uno sólo.

4.9.- Derecho al borrado total o parcial: Iberdrola podrá, en su caso, borrar, total o parcialmente, con un pre-aviso de siete días hábiles: a) Los mensajes del buzón si el cliente no accede al mismo en el plazo de noventa (90) días naturales consecutivos o si los mensajes acumulados exceden de la capacidad prevista en el Condiciones Generales I del presente contrato y b) La Página Personal, siempre que la misma exceda del tamaño permitido, pudiendo proceder a su desactivación.

4.10.- Ofertas comerciales y publicidad: En su caso, por ser tanto el buzón de Correo Electrónico como la Página Personal un servicio de valor añadido de carácter gratuito, el cliente acepta recibir en su buzón mensajes del Grupo Iberdrola ofreciéndole cualquier producto o servicio, en aplicación de la cesión de datos realizada en las Condiciones Generales V. Igualmente Iberdrola podrá incluir

publicidad en la Página Personal, siempre que no produzca perjuicio operativo de la misma.

5.- Servicio Atención al cliente.

El Servicio de Atención al cliente consiste en un servicio de asistencia técnica telefónica y/o "on line" que comprende un servicio de diagnóstico y un servicio de resolución de incidencias. Iberdrola prestará el Servicio de Atención al cliente por sí o a través de un servicio de asistencia técnica autorizado.

En los supuestos en los que Iberdrola no proporcione el equipo al cliente, Iberdrola únicamente prestará el servicio de diagnóstico, mediante resolución telefónica, online y a domicilio por incidencia en la línea, ADSL o PLC, según proceda.

Los Servicios de Diagnóstico de Resolución telefónica "on line" son servicios gratuitos, sin perjuicio del coste de la llamada telefónica o de la transmisión de datos. A este efecto, Iberdrola recogerá, únicamente, en el número de teléfono 901 20 20 20 durante las 24 horas al día, los 7 días de la semana, cualquier incidencia que afecte al funcionamiento del Servicio o bien en la dirección de correo electrónico que se comunique en el momento en que se encuentre disponible.

El Servicio de Resolución comprende un servicio de asistencia técnica telefónica y , en el momento en que se encuentre disponible, "on line" (en adelante, el "Servicio de Resolución Telefónica y "on line") y un servicio de asistencia técnica en el domicilio en que el cliente tenga instalado su equipo informático.

Para que Iberdrola pueda prestar el Servicio de Resolución "on line", será necesario que el cliente haya instalado previamente en su equipo informático el software apropiado.

Iberdrola prestará al cliente el Servicio de Resolución en el domicilio del cliente cuando lo considere necesario, y previo consentimiento del cliente, para la resolución de una incidencia del servicio. El servicio se prestará de forma gratuita cuando la causa de la incidencia sea imputable a Iberdrola. En los casos en que la incidencia sea imputable al cliente, este deberá abonar los gastos debidamente justificados por Iberdrola, de acuerdo con los precios vigentes.

En caso de avería los equipos aportados por Iberdrola, durante el período de garantía, serán repuestos con la obligación del cliente de enviar el Kit completo de Instalación, excepto la carta donde se aporta por parte de Iberdrola el identificador, contraseña y direcciones de IP del cliente a la dirección facilitada por el Centro de Atención al Cliente, sin gasto.

6.- Cesión y subrogación.

El servicio objeto de este Contrato es personal y sólo puede cederse con el consentimiento expreso de las partes. No obstante lo anterior, Iberdrola podrá ceder el Contrato o los derechos dimanantes del Contrato a cualquier sociedad participada, vinculada o sucesora que pueda prestar en un futuro el servicio objeto de estas condiciones generales, viniendo obligada a comunicarlo al cliente en los términos previstos en este contrato y sin que dicha cesión pueda significar una

reducción en las garantías proporcionadas al cliente en cuanto a la adecuación del prestador de servicios. Los cambios de titularidad del contrato darán lugar a la aplicación de las cuotas establecidas en las tarifas vigentes.

7.- Resolución.

En caso de finalización del contrato durante el periodo inicial de doce (12) meses por causa imputable al cliente, bien sea por el incumplimiento de sus obligaciones con arreglo al mismo, bien sea por su solicitud de baja voluntaria en este mismo periodo, el cliente vendrá obligado a abonar a Iberdrola, la cantidad equivalente al importe de las mensualidades que resten por pagar hasta alcanzar la finalización del periodo inicial del contrato y todas aquellas promociones y descuentos aplicados al cliente durante la vigencia del contrato.

En caso de no activación de los Servicios de Acceso a Internet por causa imputable al cliente, este vendrá obligado a reembolsar a Iberdrola los gastos en que Iberdrola hubiera incurrido para la gestión del alta en dicho Servicio de Acceso a Internet.

En caso de terminación del contrato por cualquier causa, el cliente deberá poner a disposición de Iberdrola, o de quien ésta indique, y en perfecto estado de funcionamiento, los equipos instalados en cesión de uso, en un plazo máximo de siete (7) días hábiles donde la fecha en que fuera efectiva la extinción. La prestación de este servicio tendrá carácter gratuito en los casos en que la terminación se deba a la resolución por incumplimiento de Iberdrola.

En los demás casos, el cliente deberá satisfacer el cargo por desinstalación que comprende los gastos de desplazamiento y mano de obra. Iberdrola tendrá derecho a facturar adicionalmente los importes que correspondan, en los siguientes supuestos:

- a) si los equipos no se hallan en perfecto estado de funcionamiento.
- b) si el cliente se negara a concertar una cita con Iberdrola o con el servicio técnico designado, al efecto de proceder a la retirada de los equipos, la resolución del contratado coincidirá con la fecha en que, efectivamente, se desinstalen los referidos equipos.
- c) si el cliente previamente concertada la cita oportuna para la retirada de los equipos, denegara el acceso del personal debidamente identificado de Iberdrola o del servicio técnico designado al efecto al lugar de ubicación de los equipos, en cuyo caso el cliente deberá satisfacer a Iberdrola además una indemnización equivalente al coste real en que se haya incurrido para intentar retirar los Equipos, debidamente justificado.

La resolución del contrato no exonerará al cliente del pago de los servicios utilizados hasta el momento de la resolución, pudiendo, en todo caso el cliente, reclamar a Iberdrola las cantidades que hayan resultado indebidamente cobradas.



Powerline APC-2000-VA

APC-2000 Low Voltage Data/Voice CPE Device



APC-2000 CPEs are flexible and easy to install devices that are capable of catering to any modern day communication requirements (voice, video or data).

These versatile devices are suitable for use in all kinds of powerline communication usage scenarios. Whether it is an access-network via powerline installation, or installation in MDUs where powerline augments FTTx, or any other ingenious network deployment (hotels, schools etc), the APC-2000 set of products deliver very attractive cost to performance figures.

The two members of APC-2000 family allow flexibility to choose according specific requirements, thereby helping users to get best return on their spending.

The **APC-2000-DA** is the "Data CPE" version. This device bridges 'data' on its Ethernet interface to powerline network. The data itself maybe any of voice, video or internet traffic.

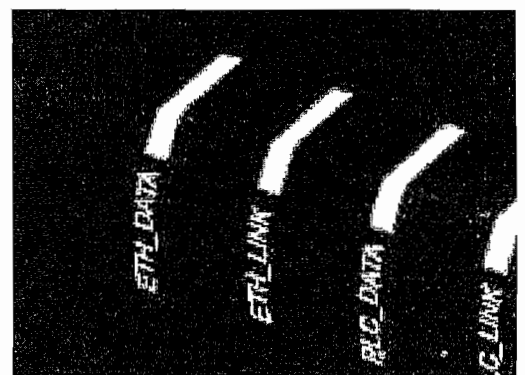
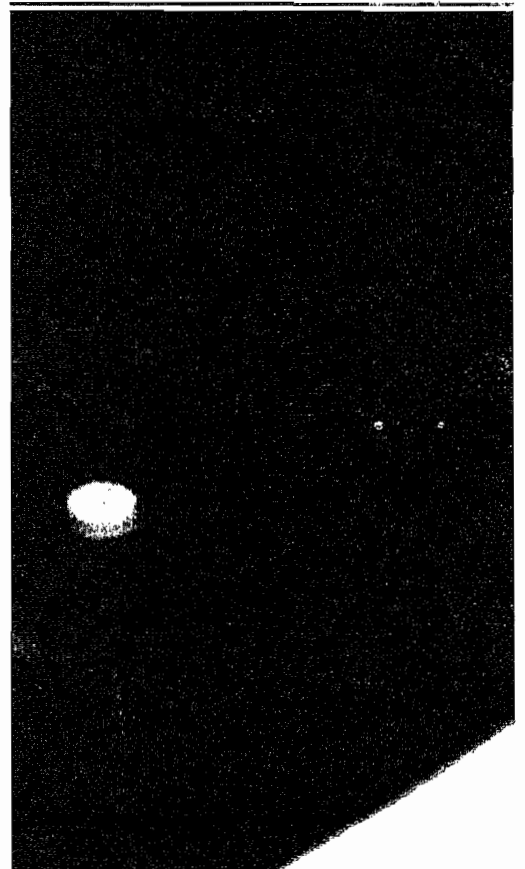
Key features of the APC-2000-DA include:

- Enables triple play services
- Easy installation (plug-and-play)
- No additional configuration to be done by end-users.
- Secure data transmission (encryption, VLAN)
- Automatic provisioning support (DHCP, configuration files)
- Remote management support (SNMP)

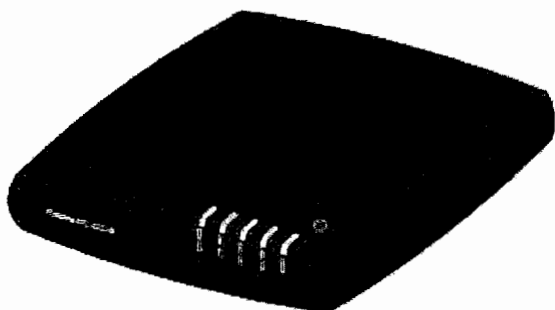
The **APC-2000-VA** is the "Voice CPE" version. Besides supporting all functionalities of the "DA" version, the "VA" provides interface to traditional analogue RJ11-port phones. It suits best in deployments where digital-voice is not available and end-customers still use POTS analogue phones. Key features of these devices include all of the ones mentioned above for APC-2000-DA.

In addition, they provide the following voice functionality :

- Possibility to choose between H323 or SIP
- Voice activity detection
- Comfort noise generation

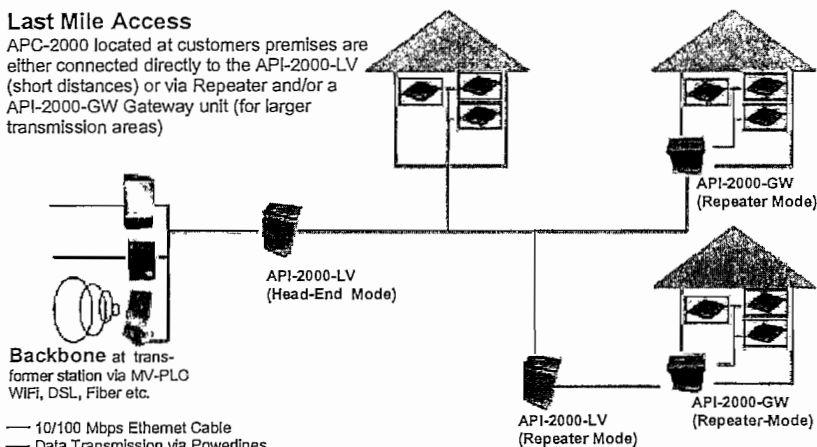


Technical Data Low Voltage CPE Device APC-2000



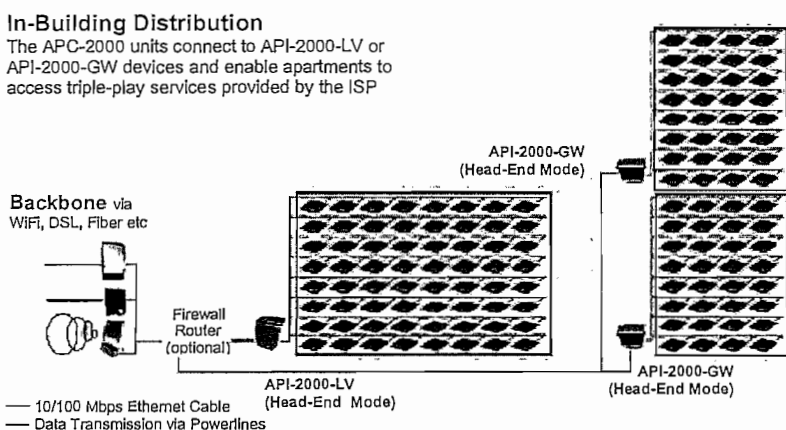
Last Mile Access

APC-2000 located at customers premises are either connected directly to the API-2000-LV (short distances) or via Repeater and/or a API-2000-GW Gateway unit (for larger transmission areas)



In-Building Distribution

The APC-2000 units connect to API-2000-LV or API-2000-GW devices and enable apartments to access triple-play services provided by the ISP



PLC Signalling

Frequency band 2 - 34 MHz
Modulation OFDM
Sub Carriers up to 1536
Signal bandwidth 10, 20, 30 MHz
Data rate up to 205 Mbps (PHY Layer)
Transmit Power -56dBm/Hz

Physical

Dimensions (HxWxD) 40x155x155mm
Weight 390g

Electrical

External Power Supply
230V ± 10% / 50 Hz or
110V ± 10% / 60Hz
Power consumption < 15 W

Environmental

Temperature 5 - 45 °C
Humidity 0 - 95 %, non condensing
Protection class IP 20

Management/Provisioning

SNMP, Web based, Console (Telnet),
Automatic provisioning

Security

802.1Q VLAN,
Encryption (DES/3DES),
Authentication/blocking (per user)

External Interfaces

Ethernet 10/100 Mbps RJ45
Analogue Phone RJ11

Protocols

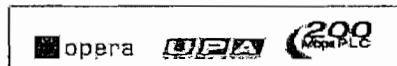
SNMP V2; TCP/IP, DHCP, FTP, VLAN,
HTTP, STP, 802.1p QoS

VoIP (APC-2000-VA unit only)

H.323, H.245, H.225, SIP, Echo
Cancellation, G.711, G.729

Standards

EN55022 / EN55024
EN60950

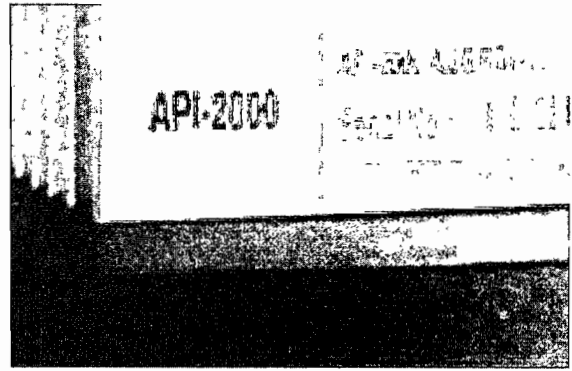


Your local reseller:

Contact:

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phone +41 62 889 56 12
fax +41 62 889 56 91

plc_marketing@ascom.com
www.ascom.com/powerline



API-2000-MV

Medium Voltage Unit

Market Trends

As powerline technology matures and more utilities announce commercial roll-outs on low-voltage segments, it becomes increasingly important for vendors to provide an effective solution that uses the available Point of Presence (PoP) of backbone in an area, rather than demanding new PoPs to make PLC an effective solution. In past, utilities used various hybrid solutions to bridge this gap from PoP to PLC, but these solutions would not cater to all network/deployment topologies.

Ascom Solution

Ascom's API-2000-MV Powerline medium voltage units allow possibilities to set up a high-speed medium voltage network and addresses the requirement to bridge the gap between low voltage termination points and PoPs. This new product from Ascom augments the already consolidated product portfolio for low voltage segment, thus making Ascom's powerline range of offerings a complete end-to-end solution for PLC deployment.

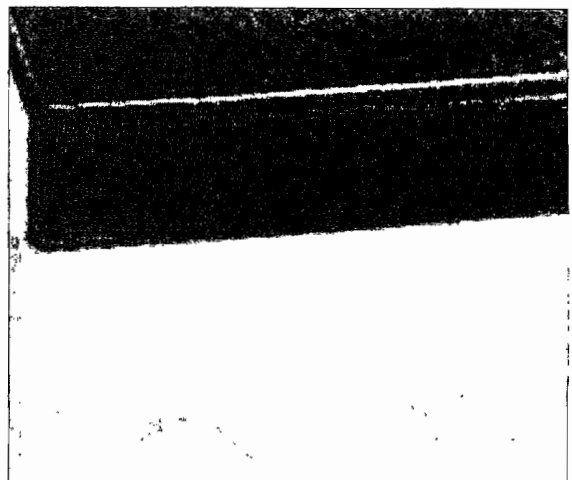
The API-2000 MV provide an ideal backbone for low voltage networks because of their better sensitivity to provide longer range and higher bandwidth of up to 205 Mbps at physical layer.

Key features

- Effective, Reliable and High Speed option for providing backbone interface to low voltage networks
- Significantly reduces deployment costs with positive influence on the Business Case
- Simple and safe installation
- Secure data transmission
- Full remote network management

Easy to manage, Simple to install

- Integrated DHCP and FTP services to support automatic remote configuration of any size network.
- SNMP agents enable efficient integration into standard network management systems
- HTTP for individual node configuration / monitoring.
- API-2000-MV units are small enough to fit anywhere.
- Standard interfaces ease the interconnection.



Ascom Powerline

Technical Data Medium Voltage Unit API-2000-MV

PLC signalling

Frequency band 3 - 34 MHz
 Modulation OFDM
 Sub Carriers up to 1536
 Signal bandwidth 10, 20, 30 MHz
 Data rate up to 205 Mbps (Phys. Layer)
 Distance up to 1500 m
 Delay < 10 ms

Physical

Dimensions (HxWxD) 295 x 150 x 85 mm
 Weight 1.7 kg

Electrical

Voltage 90 - 264 VAC, 50/60 Hz
 Power consumption < 20 W

Environmental

Temperature 0 - 45 °C
 Humidity 0 - 95 %, non condensing
 Protection class IP 20 (IP 42 option)

Remote Management Features:

SNMP, Web based, Telnet

Security Features:

802.1Q VLAN, Encryption, Per user authentication/blocking

Value Added Features:

802.1p QoS, Automatic provisioning, Familiar console interface

External Interfaces

LAN 10/100 Mbps Ethernet
 RS232 on RJ45 connector
 SDL Signal interface

Protocols

Network management SNMP V2/V3
 TCP/IP, DHCP, FTP
 VLAN, HTTP, STP

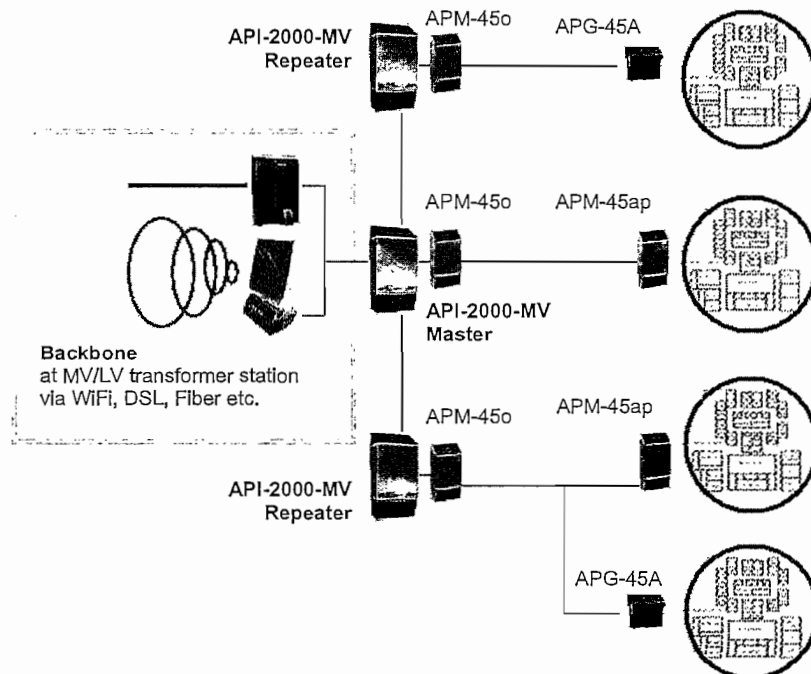
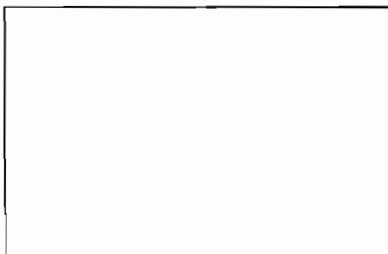


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 www.ascom.com/powerline

Your local partner:



API-2000-GW

Low Voltage Gateway Device

API-2000-GW is a specially designed low-cost, high performance infrastructure device for low-voltage powerline networks. With a transmission speed of up to 205 Mbps and the capability of handling up to 64 MAC addresses and 32 parallel PLC connections, the API-2000-GW can be used as an ideal low-cost repeater between the low voltage Head-End and CPE's inside customer premises.

Thanks to its dual mode functionality, API-2000-GW can also be configured as Head-End for In-Building distribution of other broadband access technologies, like xDSL, fiber and wireless. The standard 10/100 Base-TX ethernet interface guarantees a transparent and easy connection to the backbone network.

PLC Specific Features:

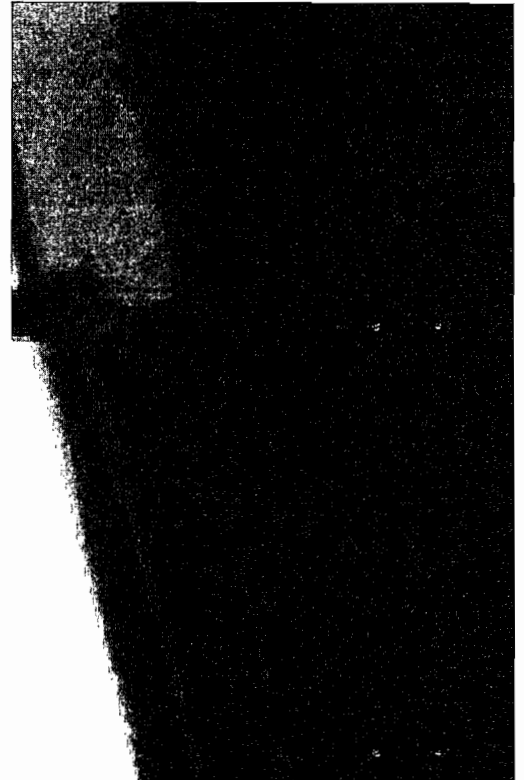
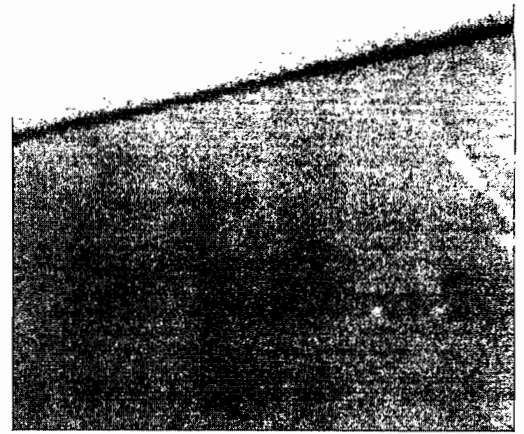
- Low cost Time Division repeater for low voltage PLC access networks
- Low cost Head-End for PLC In-Building distribution networks
- Support for up to 32 simultaneous PLC connections (slaves)
- Bridge table capacity of up to 64 MAC addresses
- High receiver sensitivity to ensure high distance coverage

Configuration and Network Management Features:

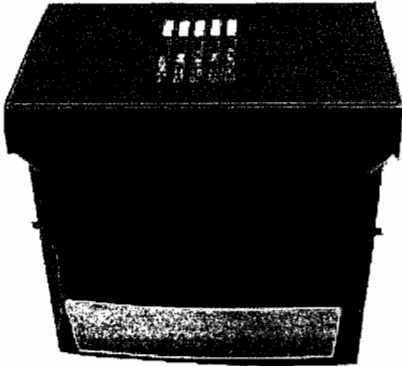
- HTTP based configuration and monitoring interface
- Industrialized command line console as alternate means of configuration
- Simple and easy to use system concept for VLAN and QoS services
- PLC signaling to minimize configuration parameters and enhance robustness
- SNMP agent to facilitate management of larger networks

Installation Features:

- Easy physical installation thanks to standardised housing for DIN Rails
- Small and slim design to fit in every customer specific installation environment

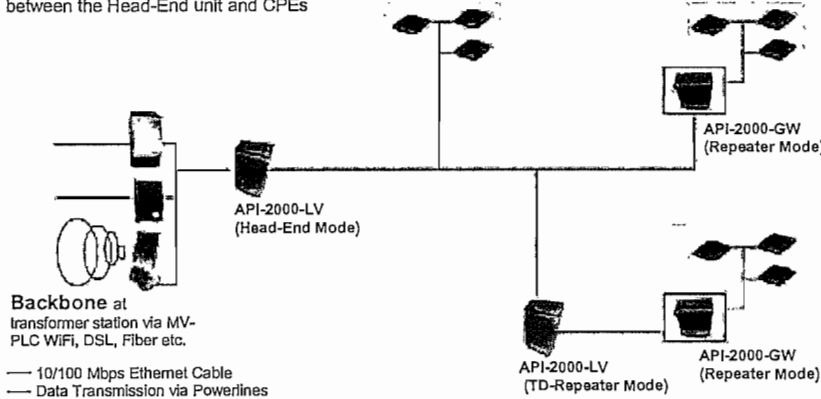


Technical Data Low Voltage Gateway Device API-2000-GW



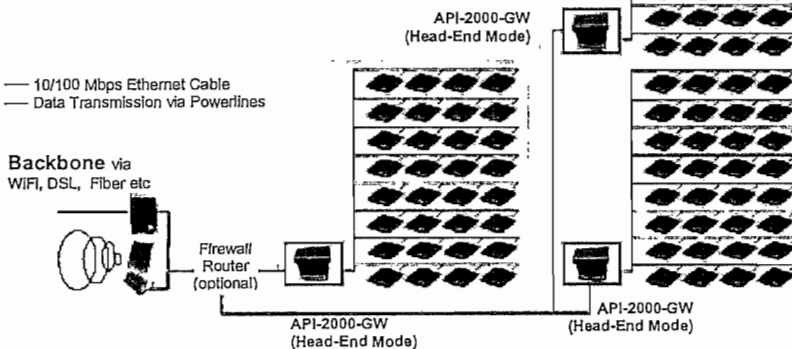
Last Mile Access

API-2000-GW is used as Repeater between the Head-End unit and CPEs

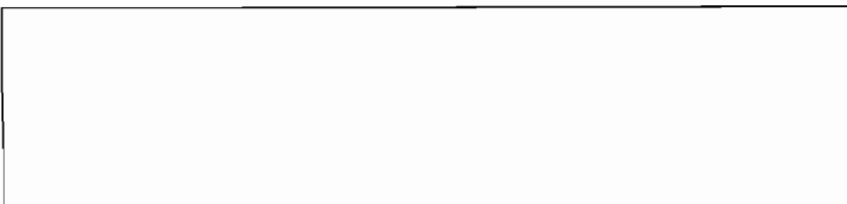


In-Building Distribution

API-2000-GW in Head-End mode is distributing triple play services within small & medium size buildings such as schools, hotels and apartment buildings. With the use of multiple API-2000-GW larger building complexes can be PLC enabled.



Your local reseller:



PLC Signalling

Frequency band 2 - 34 MHz
Modulation OFDM
Sub Carriers up to 1536
Signal bandwidth 10, 20, 30 MHz
Data rate up to 205 Mbps (PHY Layer)
Transmit Power up to -50dBm/Hz
32 Slaves / 64 MAC addresses

Physical

Dimensions (HxWxD)
165 x 150 x 86 mm
Weight 600g

Electrical

Voltage 90 - 250 VAC, 50/60 Hz
Power consumption < 15 W

Environmental

Temperature 5 - 45 °C
Humidity 0 - 95 %, non condensing
Protection class IP 20

Management/Provisioning

SNMP, HTTP based,
Console (Telnet, Serial),
Configuration file

Security

802.1Q VLAN,
Encryption (DES/3DES),
Authentication/blocking (per user)

External Interfaces

10/100 Mbps Ethernet RJ45
Service RS232 RJ45
Signal Coupling RJ45

Protocols

SNMP V2, TCP/IP, DHCP, FTP, VLAN,
HTTP, STP, 802.1p QoS

Standards

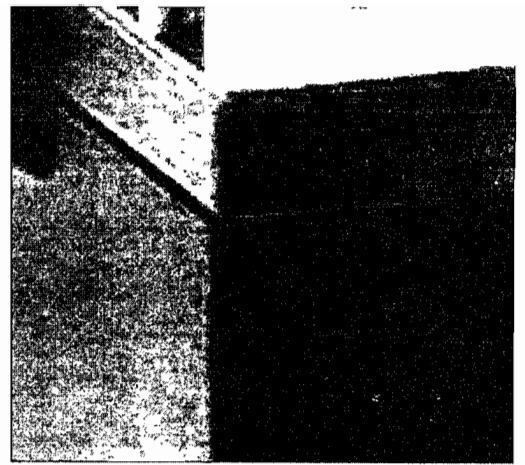
EN55022 / EN55024
EN60950
Installation Category 3



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fax +41 62 889 56 91

plc_marketing@ascom.com
www.ascom.com/powerline



API-2000-LV Low Voltage Infrastructure Device

API-2000-LV is a high performance infrastructure device designed for low voltage powerline networks. Thanks to its high transmission speed of up to 205 Mbps and capability of handling up to 1024 MAC addresses and 64 parallel PLC connections, the API-2000-LV is ideal for use as Head-End to control low voltage access networks as well as a large In-Building distribution networks.

Configured as Time Division Repeater API-2000-LV can be used to extend coverage of a PLC network. Featured with standard 10/100 Base-TX ethernet interfaces, a PLC environment controlled by API-2000-LV can be easily connected to the backbone network via xDSL, Wireless, Fiber optic, or Medium Voltage PLC.

PLC Specific Features:

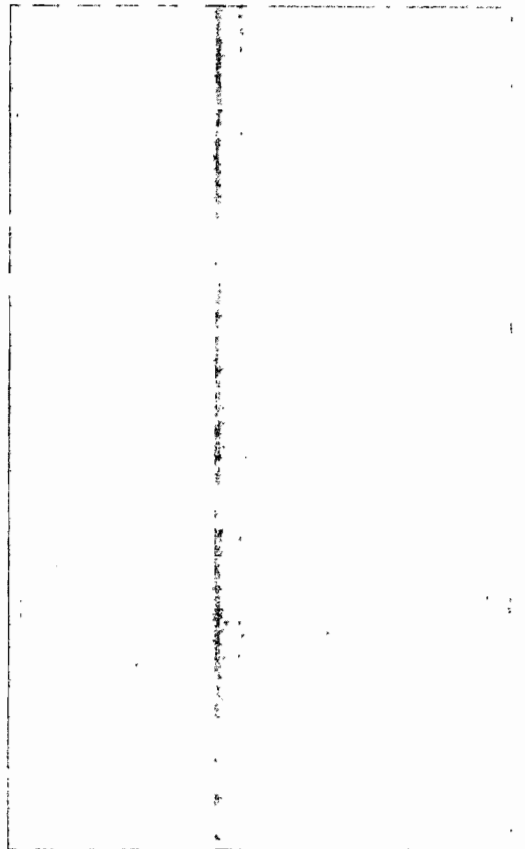
- Head-End and Time Division Repeater for low voltage PLC access network
- Head-End for large In-Building distribution networks
- Support for up to 64 parallel PLC connections (slaves/repeaters).
- Bridge table capacity of up to 1024 MAC addresses
- High receiver sensitivity to ensure high distance coverage

Configuration and Network Management Features:

- HTTP based configuration and monitoring interface
- Industrialized command line console as alternate means of configuration
- Simple and easy to use system concept for VLAN and QoS services
- PLC signaling to minimize configuration parameters and enhance robustness
- SNMP agent to facilitate management of larger networks

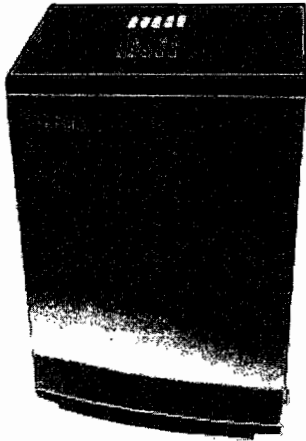
Physical Installation Features:

- Designed for simple mounting for traditional and common electrical environments
- Special Housing for installations in rough environments like transformer stations and street cabinets.



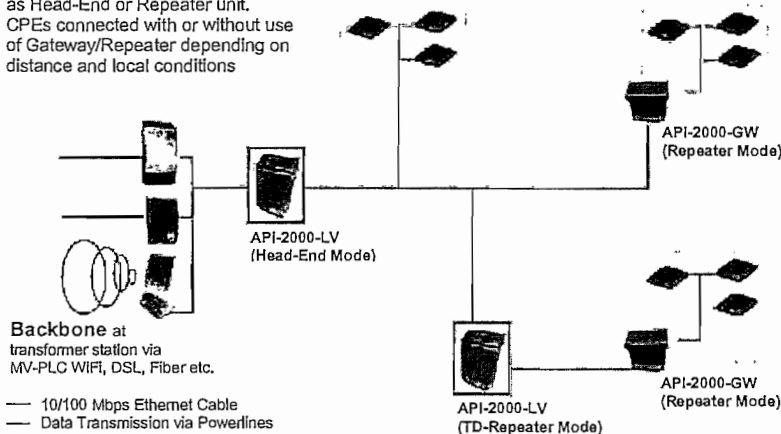
Ascom Powerline

Technical Data Low Voltage Infrastructure Device API-2000-LV



Last Mile Access

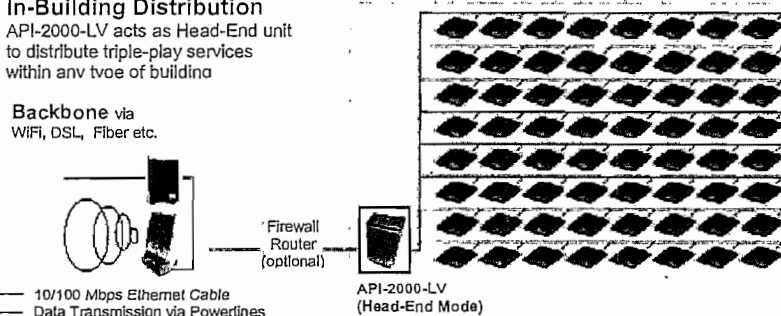
API-2000-LV units configured either as Head-End or Repeater unit. CPEs connected with or without use of Gateway/Repeater depending on distance and local conditions



In-Building Distribution

API-2000-LV acts as Head-End unit to distribute triple-play services within any two of building

Backbone via WiFi, DSL, Fiber etc.



PLC Signalling

Frequency band 2 - 34 MHz
Modulation OFDM
Sub-Carriers up to 1536
Signal bandwidth 10, 20, 30 MHz
Data rate up to 205 Mbps (PHY Layer)
Transmit Power up to -50dBm/Hz
64 Slaves / 1024 MAC addresses

Physical

Dimensions (HxWxD)
295 x 150 x 85 mm
Weight 1.7 kg

Electrical

Voltage 90 - 264 VAC, 50/60 Hz
Power consumption < 20 W

Environmental

Temperature 0 - 45 °C
Humidity 0 - 95% non-condensing
Protection class IP 20 (IP 42 option)

Management/Provisioning

SNMP, HTTP based,
Console (Telnet, Serial),
Configuration file

Security

802.1Q VLAN,
Encryption (DES/3DES),
Authentication/blocking (per user)

External Interfaces

10/100 Mbps Ethernet RJ45
Service RS232 RJ45
Signal Coupling SPD

Protocols

SNMP V2, TCP/IP, DHCP, FTP,
VLAN, HTTP, STP, 802.1p QoS

Standards

EN 55022 / EN 55024
EN 60950
Installation: Category 4



Your local reseller:

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Wired, Wireless and Powerline Communications Technology: Comparing the Technologies

While much debate in the IT community has focused on comparing wired and wireless technology, little attention has been given to technology that enables high speed data and voice transmission over existing electrical wiring – powerline communications, or PLC. Although PLC technology has roots extending back to the 1940s, it is only recently that innovative companies such as Telkonet have developed products with the security, reliability, and performance that both commercial and government customers demand. Given that the cost, effort, and time to deploy and maintain a PLC network can be substantially lower than wired or wireless, PLC holds great promise in applications where wired and/or wireless are not economically or technically feasible.

This paper attempts to evenly assess the critical differences among wired, wireless, and PLC networking in the following five areas:

- Ease of installation
- Total cost of ownership
- Reliability
- Performance
- Security

The target audience for this document include business managers and solutions architects who need to understand the key benefits, costs, tradeoffs, and risks associated with the three networking technologies to make more informed decisions about which best satisfies their particular needs.

The Technologies

About Wired Local Area Networks (LANs)

Wired LANs use Ethernet cabling and network adapters to transmit data. Wired LANs require equipment such as hubs, or switches and routers to facilitate communications among multiple Ethernet-enabled devices, such as personal computers, VoIP phones and servers which must be physically connected to the network by a cable. Devices are generally anchored to a set location depending on the placement of the network cabling. Since each hub, switch or router has a finite number of ports, only a certain number of Ethernet-enabled devices can connect. Another major limitation of wired networks is that they depend on the existence of fixed cables, which require time and in some cases considerable effort and expense to install. Additionally, connectivity is restricted to the specific locations where the network designer has prudently placed LAN drops.

About Wireless LANs

Wireless LANs (WLANs) use radio waves to transfer information between devices in a physically limited area. Typically, a wireless network is connected to a wired network via access points, which possesses both Ethernet-based LAN links and antennas to send signals. Wireless signals span microcells, or circular coverage areas

(depending on walls and other physical obstructions), in which devices can communicate with the access points, and through these, ultimately with the wired network. In a wireless LAN, devices can move within and between coverage areas without experiencing disruption in connectivity as long as they stay in range of an access point at all times.

Popular WLAN technologies are detailed below. The benefits of wireless networking depend on the standard employed:

- 802.11b is currently the most commonly used wireless standard. 802.11b utilizes 2.4Ghz band and provides a typical maximum of 11Mbps throughput. The main drawback of 802.11b is security.
- The 802.11g, utilize 2.4Ghz band and provides 54Mbps maximum throughput. The main drawback of 802.11g is reduced throughput if any 802.11b devices are present.
- Newer standards, 802.11i and 802.11n, promise to provide better security and faster data transmission speeds, but have not gained widespread acceptance yet.

Significant limitations of WLANs include:

- Interference with other radio transmitters within the same bandwidth. Since most WLANs transmit at 2.4Ghz, this means that cordless phones, RF remote controls and microwave ovens often interfere.
- Old buildings with steel mesh molded plaster walls (anything before ~1960s), stone walls, brick and mortar frequently interfere with RF transmissions.

About Powerline Communications (PLC) LANs

Powerline communications (PLC) uses electrical wiring for the distribution of data and voice services. Each A/C outlet becomes a LAN drop, allowing Ethernet-enabled devices such as PCs, VoIP phones, and servers connect to the network.

Most PLC LANs are based on the HomePlug 1.0 standard, which uses orthogonal frequency division multiplexing (OFDM) as the basic data transmission technique. OFDM manages and mitigates the amount of disturbance present at any given time in the powerlines, which is critical to ensuring the integrity of the data transmission. Like WLAN, PLC uses OFDM to counter sources of interference, such as fluorescent and halogen lamps, switching power supplies, dimmer switches, and amateur band radio transmitters, which can cause significant bit errors in data transmissions. The HomePlug technology contains a combination of sophisticated forward error correction (FEC), interleaving, error detection, and automatic repeat request (ARQ) to ensure that the channel is completely reliable to the network layer protocols. Telkonet's PLC System improves significantly upon the HomePlug standard, providing faster, more consistent performance, increased security, and enhanced network management tools not found in off-the-shelf, home products.

Telkonet's iWire System™ is the only PLC solution on the market that offers AES 256-bit encryption and is FIPS 140-2 compliant (certification pending).

Installation

Wired LANs

Cables must be run from each computer to another computer or to the central device. It can be time-consuming, difficult, expensive and disruptive to run cables under the floor or through the ceilings or walls of an existing facility.

The configuration for a wired LAN varies depending on the type of building construction encountered, the cable paths that need to be traversed, and the number of network outlets required. Another factor is time to deploy – it typically takes weeks to months to install cabling in a facility, and often the work must be done during non-business hours in order to minimize the disruption to daily activities.

Wireless LANs

Wireless networks can be configured in a number of different ways:

- "Ad hoc" mode allows wireless devices to communicate in peer-to-peer mode with each other.
- "Infrastructure" mode allows wireless devices to communicate with a central node that in turn can communicate with wired nodes on the LAN.
- Or a combination of the two.

Most WLANs require infrastructure mode to access the Internet, a local printer, or other wired services (ad hoc mode supports only basic file sharing between wireless devices and is not suitable for business environments, due to lack of scalability, security issues and poor performance). Wireless networks must connect to a wired network to be effective as a networking solution, and the same issues which impact installation of wired LANs also apply to WLANs.

Both WiFi modes require wireless network adapters, sometimes called WLAN cards, or NIC's. Infrastructure mode WLANs additionally require a central device called the access point. The access point must be installed in a central location where wireless radio signals can reach it with minimal interference. Although WiFi signals typically reach in excess of 100 feet (30m), obstructions like walls greatly reduce their range. Also, other devices radiating within the same frequency spectrum can significantly degrade performance.

PLC LANs

In contrast to wired and wireless LANs, PLC LANs require little or no new wiring to be installed. Minimal equipment is required and most deployments are completed in a matter of a few hours or a couple of days.

Four components make up Telkonet's PLC system architecture. The Telkonet Gateway acts as a remotely manageable network switch which converts data between a 10/100 Ethernet port and a PLC interface. The Telkonet iBridge™ is an intelligent, single-port Ethernet to PLC device converting an AC outlet to a lan drop. The Telkonet eXtender™ provides additional reach and scalability for network environments that cannot be properly

covered by a single Telkonet Gateway. The Telkonet Gateway or Telkonet eXtender injects the PLC signal into the AC power system via the Telkonet Coupler.

Telkonet's components are lightweight, compact, and straightforward to install – critical in situations requiring rapid, foolproof deployment. Each Telkonet iBridge communicates with the Telkonet Gateway and/or Telkonet eXtender using an AES 256-bit encrypted data stream, providing security on par or better than many wired networks. The Telkonet PLC system supports up to 63 Telkonet eXtenders, 512 Telkonet iBridges and 4,096 Ethernet endpoints.

Cost

Wired LANs

The cost to wire an existing building depends on the construction materials used, the physical layout of the facility the number of data drops or jacks required.

In addition to materials costs, labor and time must also be considered. Wiring must often take place during off-peak hours, which can impact the cost of labor as well as the schedule for deployment. Also, rewiring is highly disruptive, which means that a facility may not be available for weeks or months while the work of placing the cable and repairing damage to walls and floors is completed.

Wireless LANs

Wireless equipment typically costs more than Ethernet cable adapters, hubs, switches, and routers. In addition, it usually necessary to include in the WLAN architecture wired components to ensure reach and reliability of digital signals within a facility. Costs associated with cabling needed to support the WLAN are similar as those described for wired networks, though the time and effort required, and disruption caused, is typically less than wired.

PLC LANs

Since PLC uses a facility's existing electrical wiring as the data transmission medium, the upfront capital expenditures associated with installing copper or fiber is not a consideration. Most installations are completed in a few hours to a few days, and the size and amount of equipment required for installation is minimal. Further, since no new wiring is needed, the disruption to day-to-day operations often impacting wired installations will largely be avoided with a PLC deployment.

Telkonet offers both purchase and service models for its PLC solution. Under the purchase model, the price of Telkonet's PLC equipment is similar to wireless, with a one-time fee applied for network deployment. After Telkonet engineers survey a site and develop a network topology, they provide an estimate for installation based on the number of Telkonet Couplers, Telkonet Gateways, and Telkonet eXtenders™ required to maximize performance and reliability. For a non-secure facility, deployment typically costs \$100 per seat; for a secure site, the price per seat is approximately \$250 to cover additional costs associated with increased security considerations.

Telkonet offers an alternative to purchase with its service model. Under the service model, all equipment needed is leased on a per seat, per month basis. Software upgrades, technology

refreshments, and Tier 2 support are included in the service fee. The one-time deployment cost described earlier remains the same. The service model allows customers to more proactively take advantage of technology improvements while reducing the challenges associated with maintaining and supporting the Telkonet PLC network.

In the event that a building or location is decommissioned or the technology is no longer needed, virtually all of the Telkonet PLC network equipment is recoverable, usually in a matter of a few hours. The hardware can then be quickly re-deployed in a new location, adding significantly to the overall return on investment.

Reliability

Wired LANs

Ethernet cables, hubs and switches are extremely reliable, mainly because manufacturers have continually improved Ethernet technology over the past twenty years. Loose cables typically remain the single most common and annoying source of failure in a wired network.

Wireless LANs

Wireless LANs suffer reliability problems with greater frequency than wired LANs, though perhaps not enough to be of significant concern. 802.11b and 802.11g wireless signals can be subject to interference from cellular phones, microwave ovens, machinery, and other sources of noise. With proper installation interference can be minimized, but it is still an important consideration in the overall design of a wireless network solution.

Also important is the physical layout and construction of the facility where a WLAN is deployed. Steel, concrete, and other forms of solid construction can obstruct and limit the wireless signal.

PLC LANs

Recent innovations in the HomePlug technology, including OFDM, sophisticated forward error correction (FEC), interleaving, error detection, and automatic repeat request (ARQ) have greatly increased the reliability of PLC networks. In addition, a robust physical layer (PHY) and media access control (MAC) protocol further enable reliable communications on the power line. PHY ensures the sanctity of the basic data packet formats; MAC controls the sharing of the data packets among PLC network clients.

With many of these obstacles overcome in the latest evolution of PLC technology, powerline communications is now a feasible alternative to wired and in many cases supersedes wireless networks in terms of its reliability.

Telkonet's iWire System takes PLC a step further in providing enhanced drive, increased receiver sensitivity, improved coupling efficiency resulting in improved bandwidth throughput performance.

Performance

Wired LANs

Wired LANs offer superior performance. 100 Mbps Fast Ethernet technology is highly available and relatively inexpensive. Although

100 Mbps represents a theoretical maximum performance never really achieved in practice, Fast Ethernet is usually more than sufficient for most deployments. The choice of hubs, switches, and routers can also significantly impact throughput to the desktop, as can proper network configuration and performance tuning.

Wireless LANs

Wireless LANs using 802.11b support a maximum theoretical bandwidth of 11 Mbps, roughly the same as that of old, traditional Ethernet. 802.11a and 802.11g WLANs support 54 Mbps, that is approximately one-half the bandwidth of Fast Ethernet. Furthermore, WiFi performance is distance sensitive, meaning that maximum performance will degrade on computers farther away from the access point or other communication endpoints. As more wireless devices utilize the WLAN more heavily, performance degrades even further.

Overall, the performance of wireless technology implementing 802.11b and 802.11g is sufficient for small offices, but generally not sufficient for larger, more complex deployments. Wireless technology can be combined with wired LANs, however, to improve reach and performance. This is accomplished, however, through adding more access points and decreasing the physical distance and number of peripherals using any given access point. The greater mobility of wireless LANs helps offset the performance disadvantages. Mobile computers do not need to be tied to an Ethernet cable and can roam freely within the WLAN range. However, many PCs are larger desktop models, and even mobile computers must sometimes be tied to an electrical cord and outlet for power. Ultimately, this undermines the mobility advantage of WLANs in many situations.

PLC LANs

A number of independent entities have field tested the performance of PLC and wireless LANs. The nearly universal conclusion is that PLC networks almost always outperform WLANs, both in terms of overall transfer rate and connectivity. Physical obstacles, such as walls, introduce significant fluctuations in wireless throughput, whereas they have little or no effect on the consistency or speed of data transmitted through the PLC LAN.

Although many PLC solutions provide transmission speeds only realistically suitable for the home market (< 1 Mbps), Telkonet's iWire System meets the higher throughput requirements needed for larger implementations. Telkonet's current technology offers throughput of up to 14Mbps, adequate to support transmission of data, voice, and video in small- to medium-sized deployments. Future improvements to the scalability and performance of the Telkonet iWire System are planned for 2005, including the release of components that will enable data transmissions at speeds of ~85 to 200 Mbps while improving noise level tolerance and overall signal reach.

Security

Wired LANs

Wired LANs provide security by requiring to directly access the physical wire.

Wireless LANs

Wireless networks cannot provide physical security because the signal propagates to locations other than the intended receiver. Therefore security is provided by means of encryption. The Wired Equivalent Privacy (WEP) encryption standard was intended to provide security but was found to have serious flaws.

PLC LANs

Compared with wireless LANs, PLC LANs provide greater physical security because access to AC wiring is required. Encryption is used to further enhance security.

Telkonet's iWire System implements 256-bit AES encryption and is FIPS 140-2 compliant (certification pending) making it the only PLC solution on the market that meets the stringent security requirements for data transmission in U.S. government networks as set by National Institute of Standards and Technology (NIST) and the Department of Commerce. By law, U.S. government purchasing agents must purchase solutions that are certified for FIPS 140-2 over ones that are not. The financial community also uses FIPS 140-2 as a benchmark for products handling monetary transactions, and recognized quality organizations such as the International Standardization Organization (ISO) and the

American National Standards Institute (ANSI) have also adopted the standard. In addition to the government market, demand for AES-certified products is expected to increase in commercial markets that require the highest level of secure data encryption and privacy, such as financial, banking and medical information applications.

Which is better – wired, wireless, or Telkonet PLC?

Arguments over which technology – wired, wireless, or PLC – is 'best' will continue as standards, innovations, and market demand continue to push vendors to develop faster, more secure, and more reliable networking solutions. There is, of course, no right answer to cover all scenarios, but the case for PLC continues to grow in its attractiveness as a cost-effective and practical solution.

Telkonet is at the forefront of PLC, committed to advancing powerline communications technology as a very viable alternative and complement to wired and/or wireless networks. Planned improvements for Telkonet's iWire System will make it an even more compelling option to military, government, education, and commercial customers demanding ever faster, more economical, and more secure data, voice, and video communications.

The following summarizes each technology vis-à-vis the criteria used to assess the strengths and weaknesses of each.

	Telkonet PLC	Wired	Wireless
Ease of Installation	Minimal effort required - most networks can be deployed in less 1 day	Significant effort required	Easier than wired, but physical or environmental issues can limit effective deployment
Total Cost of Ownership	Minimal start up and ongoing costs	High initial sunken costs; minimal ongoing costs	High initial sunken costs; minimal ongoing costs, but can be higher than wired due to the need to run cables as well as install access points
Performance	Good - 14 Mbps currently, 85 to 200 Mbps future generation product	Very Good - up to 100 Mbps	Fair - up to 11 Mbps for 802.11b. Physical obstacles and distance significantly impact consistency of data transmissions speed
Security	Very Good - AES 256-bit encryption and FIPS 140-2 compliant (certification pending)	Physical security only	802.11b. is poor. Some vendors offer 802.11g with AES, but at a significant cost increase
Reliability	Highly reliable	Highly reliable	There are numerous sources of interference that can reduce reliability
Mobility	Very good	Limited	Very good

Contact Information

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Email: government@telkonet.com

Web: http://www.telkonet.com/html/government_military.html

Telkonet, Inc. (AMEX: TKO) develops products that provide secure, high-speed network and data transmission capabilities over existing electrical wiring using Powerline Communications (PLC) technology. Telkonet designs and deploys solutions that leverage PLC technology with broadband, wireless, and other access solutions for use in commercial, residential, and government applications, including the hospitality, multidwelling/multitenant housing, Federal civilian and Department of Defense, and education markets in the United States, Europe, and Asia. For more information, visit www.telkonet.com.

USB NetPlug

PLN002-02



- NetPlug PLN002-02 is a termination module allowing the transfer of high speed internet and data through the electrical network of a building or a house between your computers or video, audio equipments.

Since the electrical network is the best distributed network in a building or a house, every electrical socket becomes a potential access for all applications you wish to use. NetPlug allows to connect any terminal equipped with an USB interface to the electrical network and then to share an Internet access with dedicated services. It is also possible to share data between equipments connected on the PLC network in a total secure way thanks to the encryption realized on these data.

This is a simple and quick solution to create your own local network without any new cable deployment (or cabling extension) :

- 1- connect NetPlug and equipments you want to network together,
- 2- configure your equipments,
- 3- share data between your equipments or from the Internet.

Technical specifications

General features

- Electrical network / USB 1.1 interface
- HomePlug v1.0.1 compliant
- Individual password and MAC address
- Encryption system to secure data transferred on the electrical network (management from external software or ELEKTRA)
- Indicators lights allowing to check the electrical Network and the Ethernet interface connections status

Basic configuration required for use

- One NetPlug for each equipment to network
- TCP/IP protocols capability for networking
- One USB 1.1 type A interface
- Equipment with an operating system that supports the TCP/IP network protocol (Windows 98 Second Edition, Windows Millenium Edition, Windows 2000, Windows XP)

(NB : It is not possible to connect an USB modem to an USB NetPlug)

USB NetPlug

■ Function

- USB / CPL Bridge

■ PLC

- Chipset - Intellon INT51X1
- Encryption - DES56bit
- Interface - IEC227 - 2-pole - DIN49464F
- Speed - up to 14Mbps (raw bit rate)

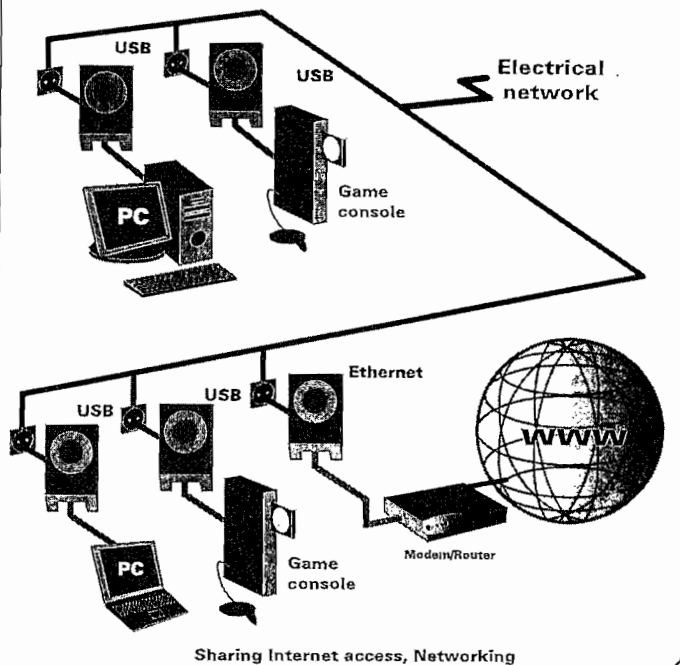
■ USB

- Version - USB 1.1
- Interface - B-type
- Speed - 12Mbps

■ LED

- PLC - Link (Active or not)
- Activity
- Collision

■ Applications



■ General specifications

- Safety - EN60950, 2nd ed.(2000)
- EMC - EN55022 / EN55024
- Humidity - 95% HR max.
- Temperature - Operating : from 0°C to +40°C
- Storage : from -25°C to +85°C
- Dimensions - L : 55 x H : 90 x D : 72 mm
- Weight - 0,2kg

Contact

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Design Graphique | www.pcv.fr

Datasheet NetPlug PLN002-02 Ang 17/08/04 E002



Fast WAN. Fast Apps. Fast Business.



PacketShaper®/ISP

Bandwidth Provisioning and Application Management

PacketShaper Value Extended to Service Providers

Running on PacketShaper 9500 and 10000 models, Packeteer® ISP edition software provides vital IP bandwidth provisioning and application management solutions for Internet service providers. PacketShaper/ISP enables ISPs to leverage the resource that their subscribers want most — bandwidth. From Internet access to VPNs, from Web hosting to intelligent buildings, PacketShaper/ISP edition software ensures reliable and efficient performance across a broad range of services. It's the answer to service providers' demands for a high-capacity solution that delivers differentiated services, ensures fair and equal access, enforces user policies and improves profit margins through various co-location services.

Opportunities for Service Providers

PacketShaper 9500/ISP and 10000/ISP enable providers to offer new services and achieve greater revenue from subscribers.

With PacketShaper/ISP, service providers can allocate bandwidth according to every subscriber's budget and needs. PacketShaper/ISP protects business-critical traffic, enforces user policies and ensures service-level commitments through layer 7 classification, analysis, reporting and policy-based control. Subscribers can choose between fixed or scaled bandwidth plans that cap usage at predetermined maximums or swell to suit demand.

Offered Services/Bandwidth Farming

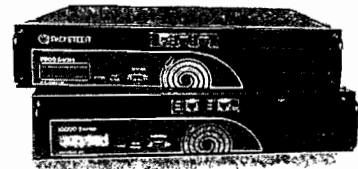
Expand service offerings based on a flexible variety of bandwidth-allocation plans including per-subscriber or per-user guarantees, caps or unlimited bandwidth.

Web-Hosting Services

Enable clients to vary their Web sites' performance by selecting from a variety of offered service levels. Clients can even vary service levels for multiple sites running off a single IP address or for different pages within a site.

Multi-Tenant Units (MTU) and Multi-Dwelling Units (MDU)

Share common access connectivity fairly and equally by dividing bandwidth among MTU and MDU tenants.



Expand bandwidth-based services

Control P2P's impact

Graph bandwidth allocation, network efficiency, top consumers and more

Control upstream and downstream traffic

PacketShaper/ISP

Bandwidth Provisioning and Application Management



Enforce User Policies

Set policies and caps to control aggressive bandwidth users who attempt to consume more than their share of bandwidth and disrupt performance for others.

Diffserv and MPLS Marking Sanitization

Police and re-mark traffic to counter and control users who manipulate packet marking to gain preferential treatment over other subscribers.

Denial of Service (DoS) Containment

Use the classification and control features of PacketShaper/ISP to contain DoS attacks.

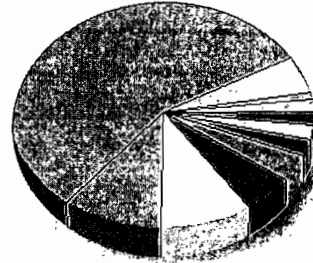
Fair and Equal Access

Ensure user equality and controlled performance for content sharing services such as peer-based music sharing services.

Centralized Reporting and Management

Packeteer offers several software solutions for managing multi-unit PacketShaper deployments. ReportCenter™ enables central reporting and analysis and PolicyCenter® provides central policy management and administration. Additionally, SNMP and XML-API provide integration with systems from leading vendors like HP, InfoVista, Concord and Aprisma.

Top 10 Applications (average bps) Report



1. NetBIOS-IP	895	56%
2. IPv6	169	11%
3. Microsoft-ds	157	10%
4. HTTP	89	6%
5. DHCP	60	4%
6. LDAP	40	2%
7. DCOM	31	2%
8. IPCOMP	29	2%
9. DNS	28	2%
10. AppleTalk	16	1%
All Others (42)	87	5%

	9500/ISP	10000/ISP
Capacity		
Maximum IP Flows	1,260,000	1,260,000
Maximum Throughput	100 Mbps	1 Gbps
Maximum Dynamic Partitions	20,000	20,000
Maximum Classes	2,500	5,000
Maximum Static Partitions	2,500	5,000
Maximum Policies	2,500	5,000
Maximum IP Hosts*	500,000	500,000
Interfaces		
Network Interfaces (in and out)	2x 1G/100/1000Base-T, 2x 1000Fiber SFP - SX (275 m) or LX (5 km or 20 km)	
LAN Expansion Modules (2 slots available)	2x 1G/100/1000Base-T; 2x 1000Fiber SFP - SX (275 m) or LX (5 km or 20 km)	
Console Port	All have RS-232 (AT-compatible) with male DB-9 connectors	
Dimensions - All are 19" rack-mountable		
Height	2U or 3.5 in (8.89 cm)	2U or 3.5 in (8.89 cm)
Width	17.31 in (43.97 cm)	17.31 in (43.97 cm)
Depth	19.25 in (48.90 cm)	20.3 in (51.43 cm)
Weight	27 lb (12.25 kg)	33 lb (14.97 kg)
Power		
Power Supply	100/240 VAC; 50/60 Hz, 6 A	100/240 VAC; 50/60 Hz, 6 A
Dual, Redundant Load Sharing	Yes, Hot-swappable	Yes, Hot-swappable
Additional Features	XML, XML and CGI APIs, SNMP MIB, SNMP event traps; HP OpenView, InfoVista, Concord et Health, Aprisma Spectrum, Micromuse Netcool	
Interoperability	DB-9 console port, web browser interface, Telnet Command Line Interface, SNMP Packeteer MIB and MIB-II support	
Agency Approval		
Safety	CAN/CSA-C22.2 No.1950-95/UL 1950, IEC 60950, EN 60950	
Emissions	AS/NZS 3548 Class A, AS/NZS 4252.1, ICES-003, Class A, EMC Directive 89/336/EEC; EN 300 386 v1.3.1-2001 Telecom EMC standard, EMC Directive 73/23/EEC, EMC Directive 93/68/EEC; EN 55022 1998 Class A; EN 61000-3-2:1995, A1(08) & A2(08), & prA1(00); EN 61000-3-3:1995, EN 55024:1998, VCCI-2002, Class A, KN55022 Class A KN6100 A 2.3.4.5.6.8.11, GOST R 60950 2002, GOST R 51318-22 99_24 99, PSB, FCC 47 CFR pt 15, subpt B, Class A	
Immunity	IEC 60950 1999 3rd Edition, EN 60950:2000; UL 60950-2000; CAN/CSA C22.2 No.60950-00; EN 60825-1-2 Class I Laser	

* Not all capacity specifications can be maximized simultaneously.
PacketShaper/ISP can support more hosts and flows, these figures represent ideal maximums for producing optimal results; figures represent total TCP and other IP flows collectively. These maximums represent concurrent flows. Performance may vary due to the number of new flows, traffic type, traffic mix, and other conditions unique to each deployment.

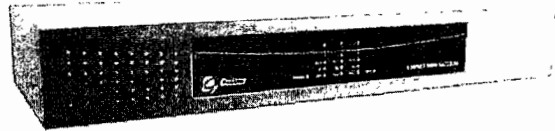
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Corinex

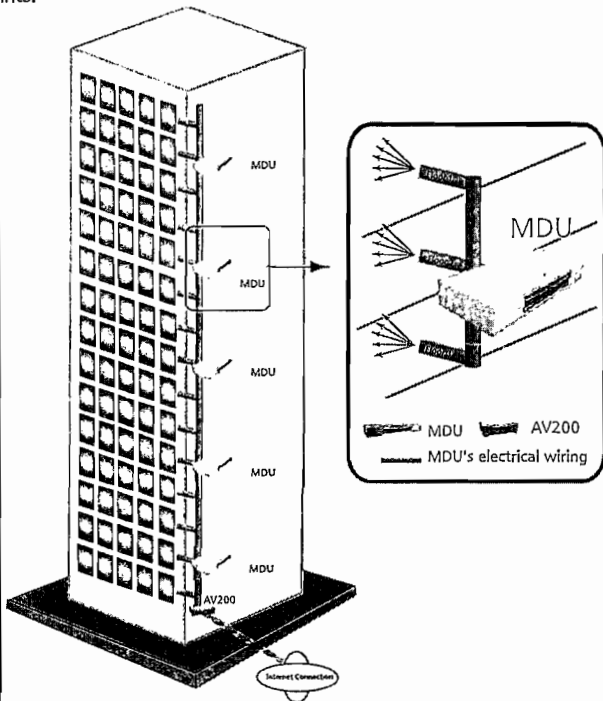
AV200 MDU Gateway



The only 200 Mbps Powerline and Coax Solution for MDU's

Introducing the most powerful solution for delivering broadband access to every room in a Multi Dwelling Unit (MDU), the Corinex AV200 MDU Gateway. The 200 Mbps MDU Gateway allows distribution of broadband signals over existing electrical wiring or coax cabling within hotels, apartment buildings, hospitals, schools, and other MDUs, every electrical or coax outlet in the MDU becomes a high-bandwidth connection. Corinex's AV200 powerline technology, based on the pre-UFA standard achieves data rates of up to 200 Mbps and propagates signals throughout an entire MDU, all without the need for pulling new wiring. Deployment of the Gateway is simple and fast, allowing Installers, System Integrators, and End Customers to deploy Internet Access, VoIP, and even Streaming Video in every room in an MDU in a few short days.

Built on the Corinex AV200 technology, the MDU Gateway can communicate with other Corinex AV200 devices such as the successful Corinex AV200 Powerline Ethernet Adapter, Corinex AV200 Powerline Router, and the Corinex AV200 CableLAN adapter. Deploying an AV200 powerline network in an MDU is simple – simply connect a single head-end AV200 modem to inject an MDU's Internet signal onto the powerlines or coax cables, connect one MDU Gateway every few floors, connect an AV200 modem in each room requiring broadband access – and you are done! The MDU Gateway is able to process signals so that even the most distant electrical or coax outlets will be able to serve as broadband connection access points.



Features

- Repeating: Extends the range of a network
- Segmentation: Allows an unlimited number of users
- Modularity: Optimizes performance while minimizing costs
- Management: Configures and Controls devices on the network

Technical description

Repeating

The MDU Gateway supports two different types of repeating depending on the customer's needs, time division and frequency division. Time division repeating divides time into timeslots – in each timeslot the repeater either receives the data, or repeats them further to the network. Time Division repeating cannot send and receive data at the same time, however, if latency is a critical parameter (such as for video streaming), frequency division repeating can be used. Frequency division repeating allows one module within the gateway to receive data while a second module repeats the data. Each module operates in a different non-overlapping frequency band. Frequency Division repeating allows repeating of data with non-measurable latency.

Segmentation

A standard AV200 powerline or coax network is limited to 32 AV200 Powerline or CableLAN modems, in order to maintain peak performance. This maximum user limitation can be a problem in larger buildings, such as hotels, where up to 100 users or more may need to have internet access at the same time. The Corinex MDU Gateway's proprietary patent pending algorithms remove the maximum user limitation and allow an installer to use a virtually unlimited number of nodes in the powerline or coax network. Each MDU Gateway can act as a master modem for a powerline or coax network segment with 32 AV200 Powerline Ethernet or CableLAN Adapter nodes.

Modularity

Modularity is a critical advantage for installers using Corinex's unique AV200 MDU technology. A maximum of three AV200 powerline modules can be included in the gateway, allowing installers to optimize the cost and performance of AV200 powerline or coax networks in an MDU.

For simple gateways using time-division multiplexing for simply repeating the signal, only one powerline module is required. A more advanced device with two powerline modules can serve as a time-division repeater and a network segment master device simultaneously. Segments may be cascaded in order to allow as many users (or rooms) required for the installation. All three variants of the Corinex AV200 MDU Gateway can be combined in a network in order to minimize latency in the network. At the same time the three module gateway acts as a master device for a network segment. All three variants of the Corinex AV200 MDU Gateway can be combined in a network in order to create the highest performance, lowest cost powerline or coax network available for MDU's.

Management

The Corinex AV200 MDU Gateway and all other AV200 powerline or CableLAN products from Corinex can be easily configured using the Corinex AV200 Network Management software using SNMP. From monitoring and configuration to remotely accessing and controlling devices, Corinex's powerful GUI based management software gives network managers control of the network from any web enabled PC.

Technical Specifications
Hardware

Standards pre-UPA standard
Compliance IEEE 802.3, IEEE 802.3u
 FCC and UL (US), CE (Europe)
Data rate Powerline: up to 200 Mbps on physical layer
 Ethernet: 10/100 Mbps
Cabling Type 1 Ethernet cable
 AC power cord
LED Status Lights POWER
 PLC1, Ethernet1, PIC2, Ethernet2, PLC3, Ethernet3
 Switch1, Switch2, Switch3

Interfaces 1-3 x Powerline port
 1x Ethernet/ Debug / Configuration
 AC power connector for both Powerline networking and power supply

Electrical Parameters Input Voltage: AC 100V-240V
 Line Frequency: 60/50Hz (USA/Europe)

Software

Supported OS Windows 98, ME, 2000, XP
Setup Tool Linux
 Mac OS X

Management AV200 Network management software

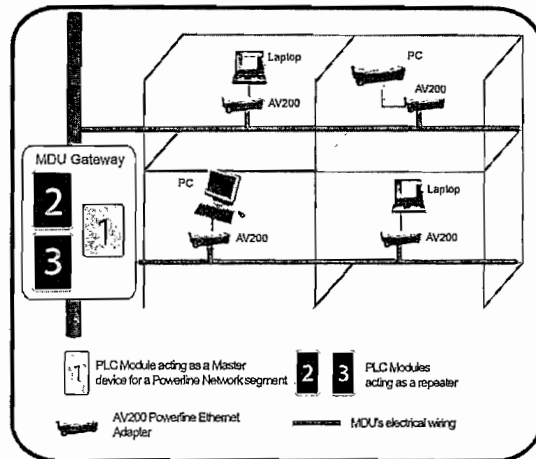
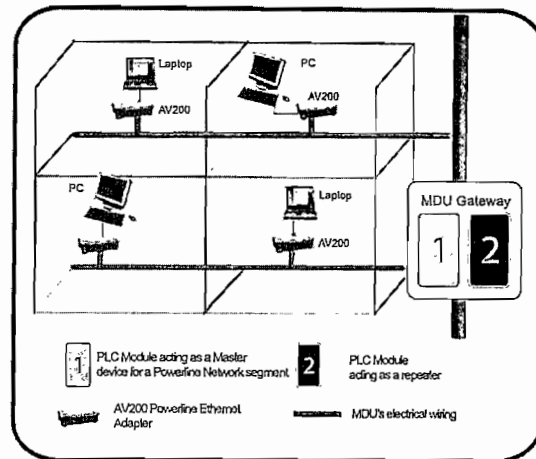
Related products

The Corinex family of 200 Mbps AV products consists of:

- Corinex AV200 Powerline Ethernet Adapter
- Corinex AV200 CableLAN Adapter
- Corinex AV200 Powerline Router

Product Package Contents

- Corinex AV200 MDU Gateway
- CD with documentation
- Quick Start Guide


Product Specifications

Product Code: CXP-MDU-GWY
 Please refer to the Price List for the exact product code and configuration for your region.



Products features and design may vary by version and region.

Corinex

AV200 Powerline Ethernet Wall Mount

200
Mbps PLC

200 Mbps
over existing
electrical
wires!



Introduction

The Corinex AV200 Powerline Ethernet Wall Mount is the world's first wall mount outlet adapter to support the distribution of video, voice, and broadband internet access over a premises existing electrical wires. With transfer rates of up to 200 Mbps, the Corinex AV200 Powerline Ethernet Wall Mount has ample bandwidth to stream several high quality video signals, such as HDTV, while simultaneously delivering high speed internet access throughout an entire premise! The AV200 Powerline Product family consists of an Adapter, Router, ADSL2+ Wireless Gateway and a CableLAN adapter and CableLAN router for coaxial networking applications, all offering 200Mbps communications.

The AV200 Powerline technology by Corinex provides numerous networking possibilities with amazingly fast physical layer transfer rates up to 200 Mbps. Finally, real world multimedia network applications can be created without adding any new wiring, simply plug in a Corinex AV200 Powerline Ethernet Wall Mount and any computing device in the entire premise is ready to receive high bandwidth multimedia signals.

Application priority levels are retained, ensuring that applications with real-time requirements, such as VoIP, streaming video and multiplayer head-to-head games do not experience glitches, frame loss, or delays, even if other users in the network are downloading large files, websurfing or downloading or listening to MP3 songs.

The Corinex AV200 Powerline Ethernet Wall Mount allows users to create a high-speed local area network, without the need for new cabling. Users can connect the AV200 Powerline Ethernet Wall Mount to virtually any electrical outlet in their home or office to create a link to the powerline network. The network can be connected to an internet gateway, such as an ADSL or cable modem, providing a convenient extension of the internet to the powerline within a premise.

Any ethernet-enabled device, such as a desktop computer, network printer, laptop computer, or a security camera connect to the AV200 powerline network.

There are two versions of the Corinex AV200 Powerline Ethernet Wall Mount. The Home Users Edition of the product is meant for home networking applications and simple plug and play installations. The Commercial Edition of the product is used for advanced networking applications, deployments in Multi dwelling Units and operators providing BPL Access.

Features

- 10/100BaseT Fast Ethernet interface
- Physical data rate in the powerline up to 200 Mbps with distances up to 300 m.
- Built-in repeating capabilities for increased coverage
- CSMA/CARP (Carrier Sense Multiple Access with Collision Avoidance and Resolution using Priorities) protocol
- Bridge Forwarding Table for 64 MAC Addresses
- 802.1Q VLAN & Optimized VLANs
- Powerful DES/3DES encryption
- OFDM technology and powerful error correction system allow robust performance under harsh conditions in the electrical network
- Integrated 802.1D Ethernet Bridge With Optimized Spanning Tree Protocol
- 8-level priority queues, with programmable priority-classification engine
- Priority classification according to 802.1P tags, IP coding (IPv4 or IPv6) or TCP source/destination ports
- Optimized support for broadcast and multicast traffic
- MAC filtering - can discard Ethernet frames if they come from a source MAC address which is not present in a list of allowed MAC addresses
- Configuration using an embedded web interface

Commercial Edition:

- Console Interface
- Dynamic IP Address with auto-config
- Manual MASTER / SLAVE configuration
- VLAN and OVLAN Support
- RADIUS server authentication support
- Programmable bandwidth allocation
- Master Node HE or Repeater
- Slave CPE Node
- Can be used for MV/LV BPL networks

Home User Edition:

- Web interface
- Fixed IP or DHCP
- Default IP 10.10.1.69
- The MASTER and SLAVE can be set manually or automatically
- VLAN tagging without filtering

Technical Specifications

Standards Compliance	IEEE 802.3u 802.1 P 802.1 Q
Speed	Up to 200 Mbps on physical layer
AC Plug Type	US, EU, UK and AUS
LED Status Lights	Power on, PLC Link/Activity Ethernet link
Interface	10/100BaseT Fast Ethernet, Powerline
Frequency Range used	2 – 34 MHz
Power Input	85 to 265 V AC, 50/60 Hz
Dimensions	107 mm L x 72 mm W x 79 mm H
Transmitted Power spectral density	-58 dBm/Hz
Power Consumption	4 W
Safety & EMI	FCC Part 15, EN 55022 EMC limits
Operating Temperature	0° to 40°C (32°F to 104°F)
Operating Humidity	10% to 80% non-condensing

Standards

- 802.3u
- 802.1P
- 802.1Q
- Compliant with FCC Part 15, EN 55022 EMC limits

Package Contents

- Corinex AV200 Powerline Ethernet Wall Mount
- One standard CAT5 ethernet cable
- CD with documentation
- Printed Quick Start Guide

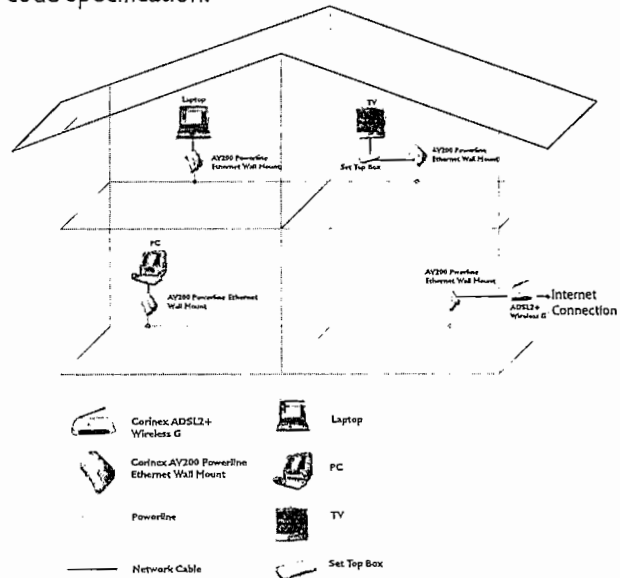
Product Specification

Product code: CXP-AV200-WME

CXP-AV200-WME - Home Edition

CXP-AV200-WMEC - Commercial Edition

Please refer to the Price List for the exact product code specification.



Product features and design may vary by version and region.



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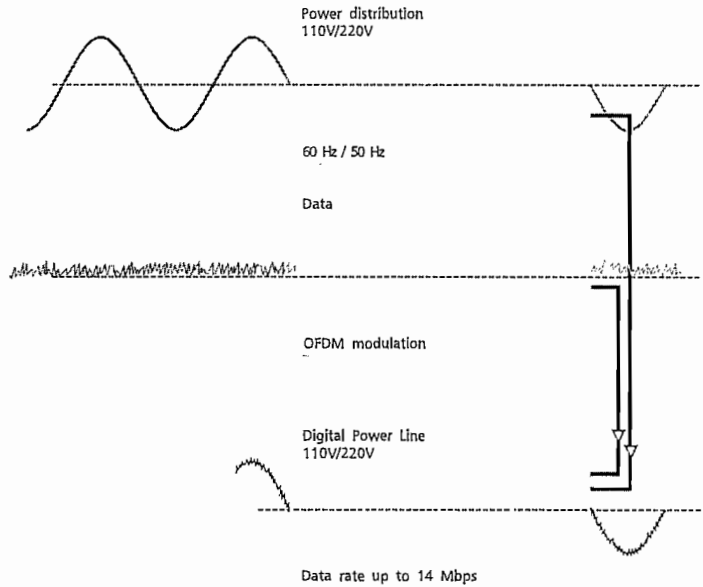
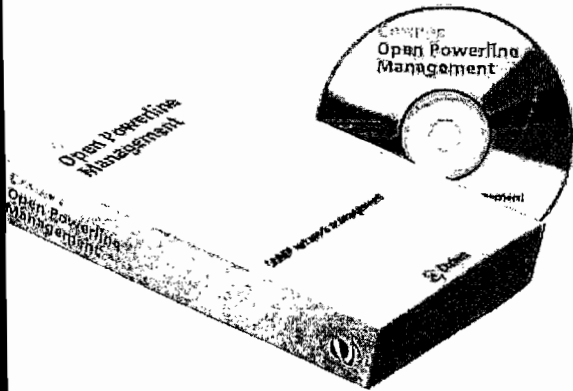
2006-02-01 ver.2.0

Corinex



Open Powerline Management

Over the last few years, Multi Service Operators (MSOs) have upgraded their access networks to a high bandwidth communication infrastructure to offer Internet, streaming video, interactive Digital TV, online gaming and entertainment services to their customers. These new services allow to restructure the potential revenue per each subscriber easily and increase the flat fees from Internet, basic TV and voice access services. The operators who are targeting the residential and small business market gain now a new opportunity to capitalize upon their market position by employing technologies that allow them a full control of the infrastructure all the way from the access to the last device in the network.



Powerline Communications

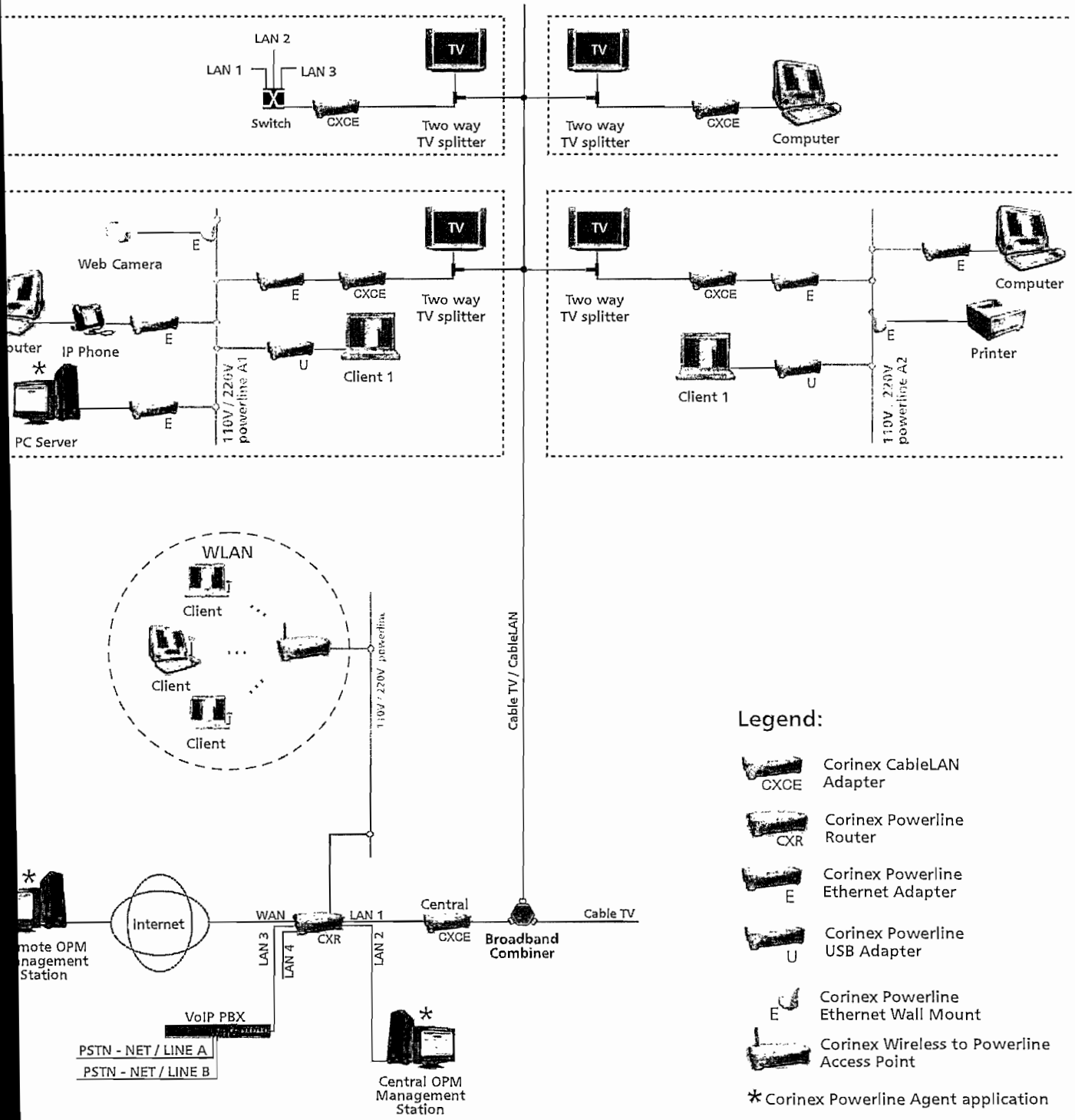
Corinex Powerline products (USB, Ethernet, Wall Mount, Router Wireless) are designed to use existing AC electrical wiring in the home as a networking physical medium. Robust performance in the electrical noisy power line channel is achieved by the use of the Orthogonal Frequency Division Multiplexing (OFDM) technology. This multi-carrier modulation scheme allows devices to dynamically "surf the channel" - constantly shifting data from one carrier to another as noise and situation conditions change. The OFDM technology finds the quietest, low attenuation portions of the spectrum available to use and continues data transmission.

Corinex Powerline products have been optimized for high-speed networking applications. Internet and network access is available through every power outlet in the home or office. Corinex's HomePlug certified Powerline networking technology supports up to 14 Mbps data rates. Corinex Powerline adapters are certified by and compliant with the HomePlug Powerline Alliance Industry Specification 1.0.1. This ensures interoperability with other HomePlug devices. Powerline technology provides a quality of service for the adapters to ensure secure, reliable channels for transferring files, streaming audio, video, or data and even online gaming.







What Can a Corinex Open Powerline Management Provide?

Corinex Open Powerline Management (OPM) is a powerful and versatile network management software tool that allows the operator to configure, monitor and test all CableLAN and powerline devices across their entire network. Corinex Open Powerline Management is based on SNMP (Simple Network Management Protocol) - a standard protocol for enhanced management and testing of communication devices. The management is independent from any hardware configuration and as a worry-free system, designed for future network expansion with support for HomePlug standard certified powerline devices. A standalone management system for the Corinex CableLAN and powerline devices in the network is built into the Corinex SNMP platform.

The platform's flexibility allows the integration of any SNMP communication device upon demand easily. A very interesting aspect for service providers, who would like to manage their combined wireless, CableLAN and powerline network efficiently!



Legend:

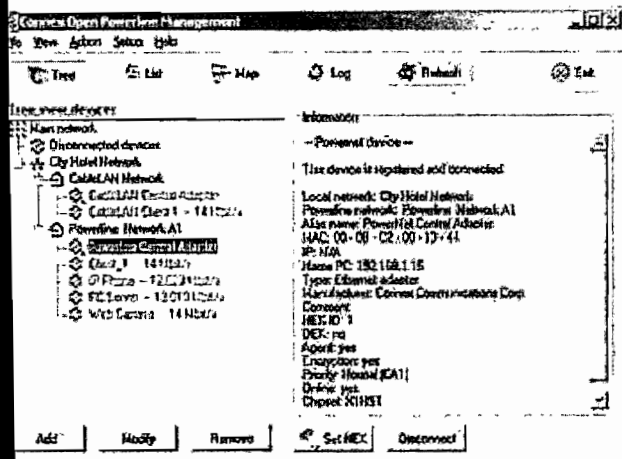
-  Corinex CableLAN Adapter
-  Corinex Powerline Router
-  Corinex Powerline Ethernet Adapter
-  Corinex Powerline USB Adapter
-  Corinex Powerline Ethernet Wall Mount
-  Corinex Wireless to Powerline Access Point
- * Corinex Powerline Agent application

Corinex Open Powerline Management is designed to manage the entirely new designed and enhanced Corinex Powerline and CableLAN products family, consisting of:

- Corinex Powerline Ethernet Adapter
- Corinex Powerline USB Adapter
- Corinex Powerline Ethernet Wall Mount
- Corinex Powerline Router
- Corinex Wireless to Powerline Access Point
- Corinex CableLAN Adapter

Product Features

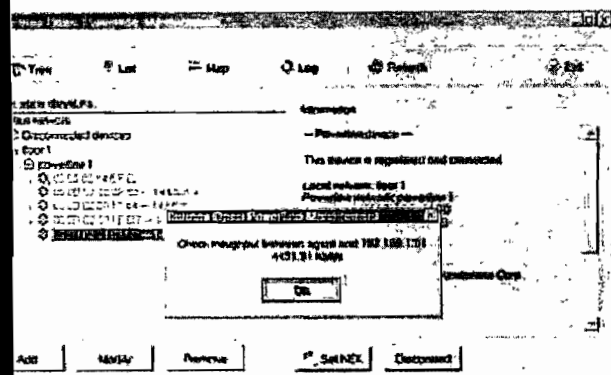
Seamless Management of Complex Networks over Long Distances



Creating a Logical Structure of Networks

Corinex Open Powerline Management enabled computer act as a base station and collect management data from other CableLAN and powerline network nodes efficiently. Any network can be managed by the OPM, either locally or remotely, as long as one computer or router in the network uses a Powerline Agent application responsible for the installation of encrypted SNMP commands. The OPM enabled computer uses SNMP commands to activate the agents to look for all CableLAN and powerline devices in their networks. This makes any customer's network completely manageable and offers high flexibility. The network is easily remotely accessible by the operator's network administrator through the Internet.

High Usability and Manageability



Real Throughput Measurement - Result

The OPM's wizard helps the administrator to create a logical structure of all managed networks and to define the Agent by exploring the network segment (to add or delete devices).

- Powerline Network Testing Makes the Installation Easy and Effective

Another very exciting feature of the management software is its ability to monitor and test the quality for all electrical outlets within a building before a powerline network installation!

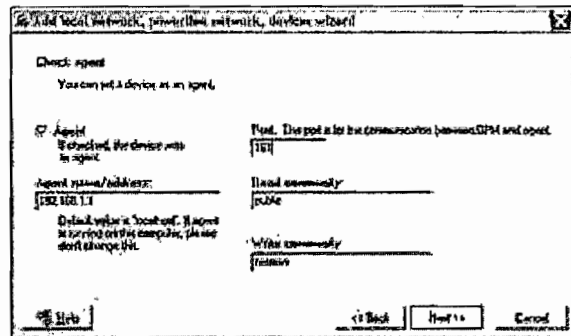
This is a unique feature many service providers are looking for in combination with the ability to collect statistical data and having an event logging capability on hand. Corinex Powerline Agent implemented in a network enables the administrator to measure a maximum theoretical throughput level for each powerline device in the connection to the Agent's powerline device. The OPM allows measuring the real throughput between the Agent's device and any other device having assigned an IP address connected to the same network as the Agent's device.

The powerline management software offers also easy to use and intuitive graphical interfaces for all networking utilities and enables an easy and effective installation of CableLAN and Powerline communication equipment.

Operator's network administrator can change a customer's device security settings even remotely and is able to create secure networks for user groups. It is not possible to reach the operator service from the powerline or the CableLAN adapter without a unique password dedicated by the operator to the adapters.

- Remote Password Management

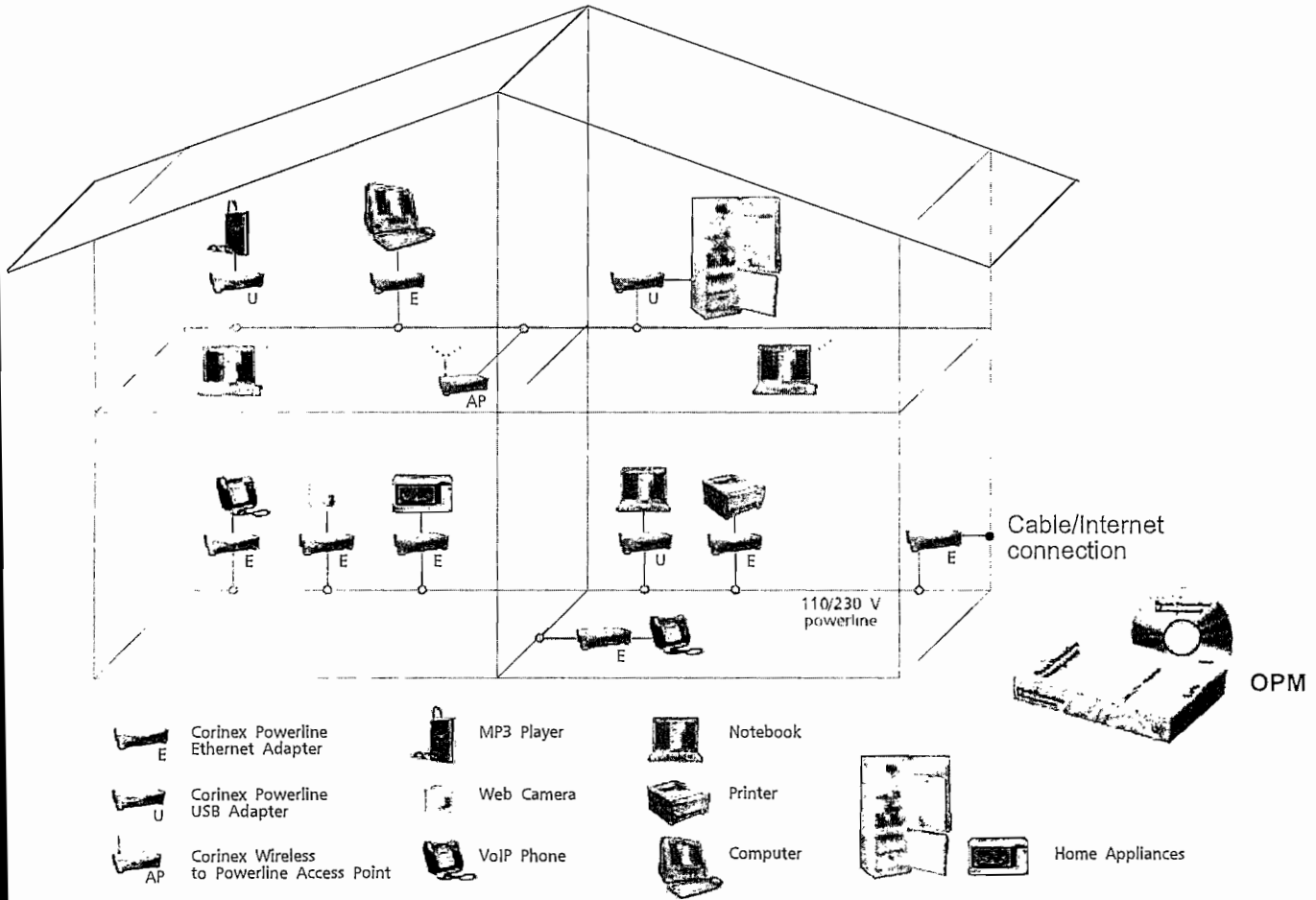
A password management enables the operator to choose which CableLAN or powerline device will be allowed to access the service. An installation for connectivity of any additional device (for example if bought in a retail channel) requires an interaction between the user and the operator. The Operator is immediately in control and can change a customer password without her/his knowledge or approval - in accordance with a potential service agreement in place.



Adding Powerline Device - Powerline Agent Settings

- Creating a logical structure of networks
- 56 Bit DES link encryption with key management for secured communication
- GUI Interface for easy communication, running on Windows 98SE, 2000, NT, XP
- Managing Powerline Adapters, Corinex Wireless Access Points, Corinex Powerline Routers, CableLAN Adapters, disregarding on which OS is the attached host running
- SNMP platform compatibility
- Easy to use and install

Manage your Household Devices with Powerline



Powerline Connected Household - Future of Home Networking

Product Specifications

Product Code: CXM-OPM
 Please refer to the Price List for the exact product code and specification.

Product Content
 Installation CD
 Printed Manual

Technical Specifications

- Protocol Support:
 SNMP v.1, SNMP v.2, HomePlug 1.0.1
- GUI Operating System Support:
 Windows 98SE, 2000, ME, NT, XP
- Agent Operating System Support:
 Windows 98SE, 2000, ME, NT, XP, Linux

Corinex



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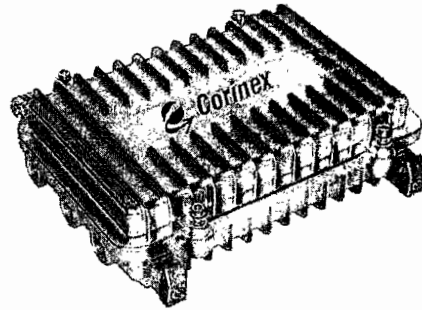
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Corinex Low Voltage Access Gateway



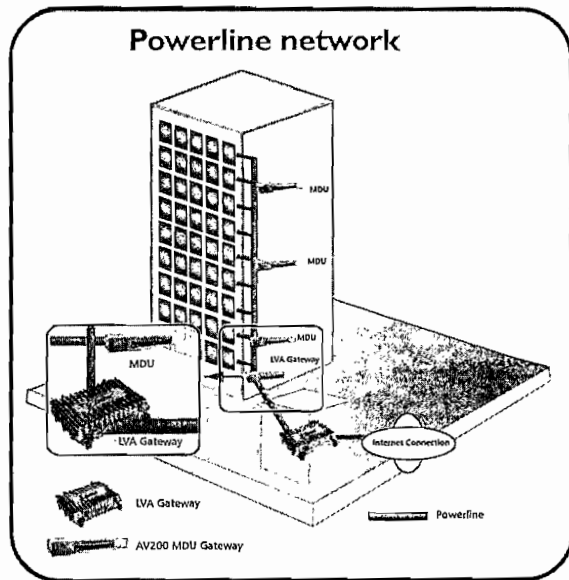
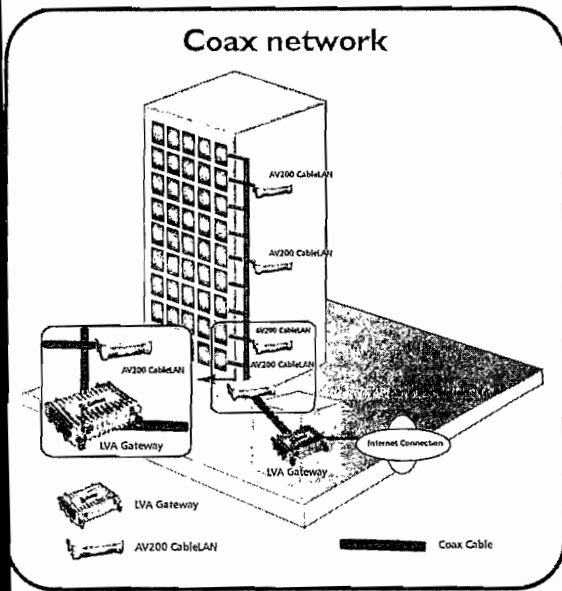
The Corinex Low Voltage Access Gateway is the latest development in 200Mbps AV200 technology from Corinex. The LV Gateway allows an easy installation to neighborhoods or Multi Dwelling Units (MDUs) where the LV Gateway acts as a head-end modem, extending an internet connection (Fiber, ADSL, Satellite) either to a powerline or coaxial cable infrastructure, depending on the customers requirements.

The Corinex LV Access Gateway allows users to extend an internet connection to a powerline or cable network within an MDU, without the need for installing new wiring. End users can connect their Ethernet enabled devices such as PC's, VoIP phones, Media Centers, etc., using the Corinex AV200 Powerline Ethernet Adapter or Corinex AV200 CableLAN Adapter, to any electrical or coaxial socket in a premise to create a link to the internet.

By combining the Corinex LV Access Gateway with the Corinex MDU Gateway, MDU's can avoid the problem of excessive delays associated with traditional Time Division Repeaters being used for multiple MDU's within the same community. Corinex's powerful patent pending technology ensures that each LV Access Gateway communicates only with each head-end MDU Gateway, not with the hundreds or thousands of end users that other LV Access products must share time slots between. The net effect is a network topology that delivers maximum performance and has virtually unlimited scalability.

AV200 Powerline technology by Corinex provides numerous networking possibilities with amazingly fast physical layer transfer rates of up to 200 Mbps. OFDM technology and the powerful error correction system used in AV200 technology allow for robust performance under harsh conditions in electrical or coaxial networks. Combined with other Corinex Access and In-Premise products such as the Corinex Medium Voltage Access Gateway, Corinex AV200 Router, Corinex AV200 Powerline Ethernet Adapter, and Corinex AV200 CableLAN Adapter, the Corinex Low Voltage Access Gateway rounds out the largest 200 Mbps Powerline product portfolio in the world.

The Corinex Low Voltage Access Gateway also supports external low voltage couplers that can be used to inject an internet signal into different phases within the MDU or to couple into other voltages such as the 480v power found in many MDU's.



Features:

Physical data rates of up to 200 Mbps over distances of 300 meters (powerline) or 1200 meters (coax).
 Powerline and coaxial network interface ports allowing an internet connection to be extended over electrical wiring or existing cable infrastructure.
 802.1Q VLAN & Optimized VLANs
 Powerful DES/3DES encryption
 Integrated 802.1D Ethernet Bridge With Optimized Spanning Tree Protocol
 8-level priority queues, with programmable priority-classification engine
 Priority classification according to 802.1P tags, IP coding (IPv4 or IPv6) or TCP source/destination ports
 10/100BaseT Fast Ethernet interface for connection to the internet Gateway
 SMA/CARP (Carrier Sense Multiple Access with Collision Avoidance and Resolution using Priorities) protocol
 Bridge Forwarding Table for 64 MAC Addresses
 FDM technology and powerful error correction system allow robust performance under harsh conditions in the electrical/cable network
 Optimized support for broadcast and multicast traffic
 Optional external coupling on coaxial port
 Configuration via web interface or via Corinex 200 Network Management software

Standards

IEEE 802.3u
 IEEE 802.1P
 IEEE 802.1Q
 Compliant with FCC Part 15, EN 55022 EMC limits
 UPA-compliant

Package Contents

Corinex Low Voltage Access Gateway
 Power cable
 Coax cable
 Installation Guide and CD with documentation

Product Specification

Product code: CXP-LVA-GWY

Technical Specifications

Standards Compliance	IEEE 802.3u Pre-UPA compliant
Backbone Speed	Up to 200 Mbps on physical layer 100 Mbps on ethernet
AC Plug Type	US, EU, UK and AUS
LED Status Lights	Power, PLC Link/Act, Eth Link/Act
Interface	10/100BaseT Fast Ethernet, Powerline Port, Coaxial Port
Frequency Range	2 – 34 MHz
Power Input	85 to 265 V AC, 50/60 Hz
Weight	7 kg
Dimensions	230 x 185 x 80 mm
Transmitted Power spectral density	-50 dBm/Hz
Power Consumption	7 W
Safety & EMI	FCC Part 15, EN 55022 EMC limits
Operating Temperature	0° to 50°C (32°F to 122°F)
Operating Humidity	10% to 80% non-condensing

Product features and design may vary by version and region.



Corinex AnyWire Connectivity™

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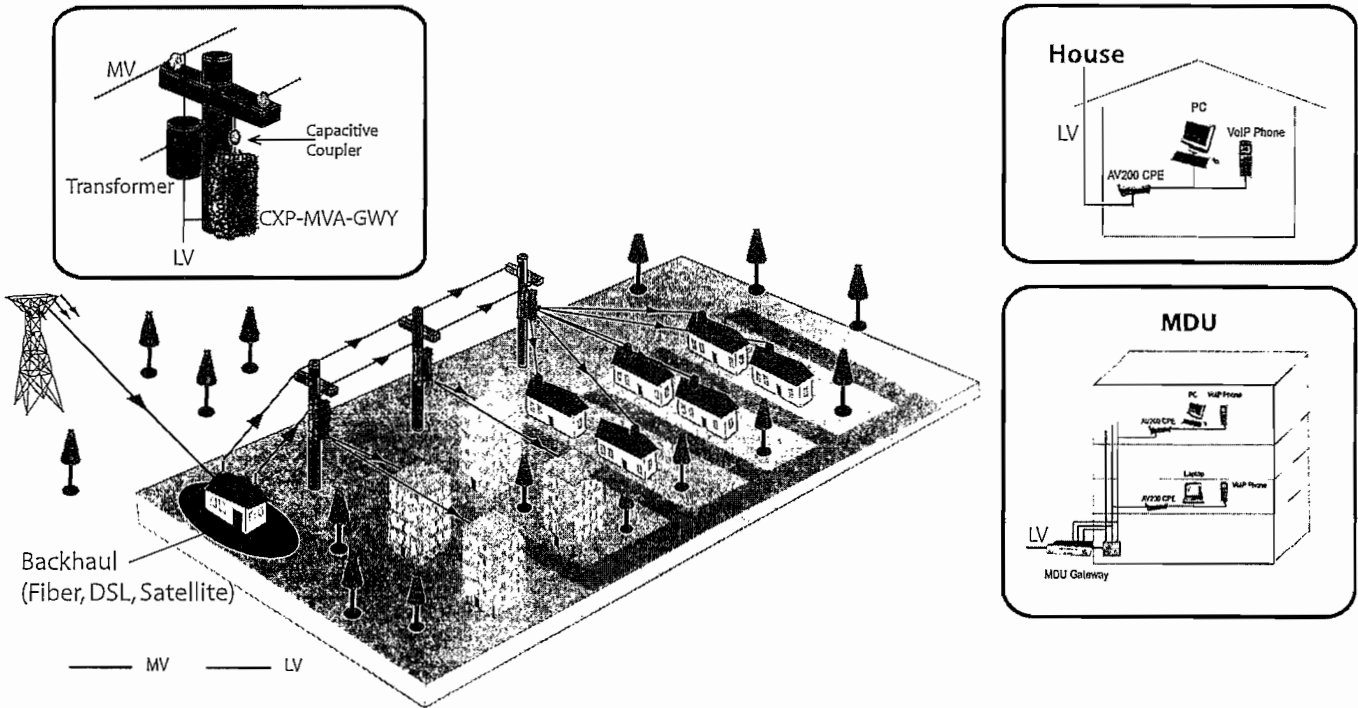
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2005-08-18 ver.1

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Corinex Medium Voltage Access Gateway/Regenerator

200 Mbps Broadband Backbone over Existing Electrical Grids!



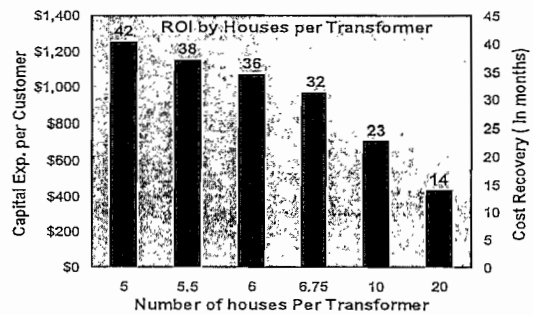
Corinex Medium Voltage Access Gateway/ Regenerator allows utilities to use their existing Powerline Infrastructure to provide high-speed broadband signals to commercial and residential buildings in urban or rural areas.

With a transfer rate up to 200 Mbps, the Corinex MV regenerator transmits and repeats signals up to 2 kilometers (1.25 miles) between regenerators on the MV lines. Utilities can now provide broadband access to their subscribers, even in rural areas where no other high-speed technologies are available.

Corinex BPL technology opens up new opportunities for utilities by using their existing power line grids to generate new revenue streams while reducing their operational costs by providing enhanced power distribution services such as: Automated Meter Reading (AMR), Distribution Automation, High-Voltage Fault / Downed Conductor Detection, Transformer Evaluation and Monitoring, SCADA, Power Quality Monitoring, Remote Control Load Balancing to maximize efficiency, Home Security and more.

The Corinex MV package includes all of the necessary parts and installation such as couplers and cables at an unbeatable price that allows utilities to recover the cost of investment in as little as 2 years. The chart below shows the return on investment based on the number of houses per transformer.

Utilities can achieve an ROI in less than two years with an average of \$700 or less capital expenditure per customer.



Corinex ODM BPL Access Program

For companies wishing to protect and build their own brand in the Access BPL market, Corinex offers the only ODM program available in the industry. Combine our leading design and manufacturing expertise with your sales and marketing team to offer the best Access BPL network solutions to your customer base. Your complete solution includes BPL Regenerators, Couplers, Software, and Customer Premise Equipment, everything required to meet any utility or operators unique needs. Corinex supports your company with a full training program, onsite support, sales and marketing tools, and access to the industry's only standardized BPL Access Pilot Program (BAPP). Sell a product with proven market acceptance today!

Technical Specifications

Standards Compliance	IEEE 802.3u
Backbone Speed	Up to 200 Mbps (TDD) Up to 85 Mbps (FDD)
MV/LV Powerline Type	Overhead Underground
Interface	MV: F-Type Coax Connector LV: Custom Interface
Frequency Range	2 – 34 MHz
Power Input	85 to 265 V AC, 50/60 Hz
Weight	7 kg
Dimensions	400mm L x 230mm W x 170mm H
Transmitted Power Spectral density	-50 dBm/Hz
Power Consumption	35 W
Safety & EMI	FCC Part 15, EN 55022 EMC limits
Operating Temperature	-20° to 50°C (-4°F to 122°F)
Operating Humidity	10% to 80% non-condensing

Features

- All-in-one unit for both MV repeating and LV coupling with molex and coaxial interfaces
- 200 Mbps backbone data rate with distances of up to 2 kilometers per regenerator
- Superior security with powerful DES/3DES encryption
- Remote management capabilities with SNMP protocol support
- Bridging Support for up to 2048 MAC addresses
- 802.1Q VLAN & Optimized VLANs
- OFDM technology and powerful error-correction system allow robust performance under harsh conditions in the MV/LV power lines
- Integrated 802.1D Ethernet Bridge With Optimized Spanning-Tree Protocol
- 8-level priority queues, with programmable priority-classification engine
- Priority classification according to 802.1P tags, IP coding (IPv4 or Ipv6) or TCP source/destination ports
- MAC filtering - can discard ethernet frames if they come from a source MAC address which is not present in a list of allowed MAC addresses
- Configurable frequency notching of frequency bands, including Amateur Radio and Restricted Frequency Bands

Standards

- 802.3u
- 802.1P
- 802.1Q
- Compliant with FCC Part 15, EN 55022 EMC limits
- UPA-compliant

Package Contents

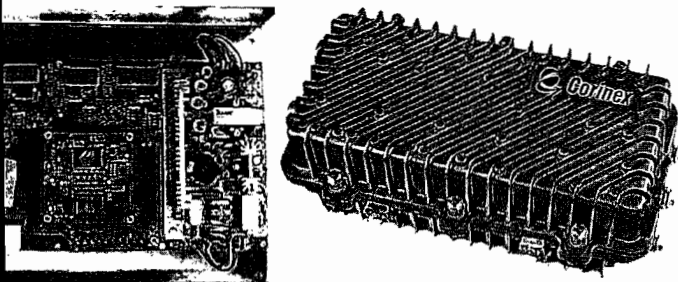
- Corinex Medium Voltage Access Gateway/Regenerator
- One LV power cable
- Installation Guide and CD with documentation

Accessories (optional)

- Overhead Capacitive Coupler to 12.5 KV line voltage
- Overhead Capacitive Coupler to 25 KV line voltage

Product Specification

Product code: CXP-MVA-GWY



Product features and design may vary by version and region.



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2005-08-12 ver.2

DIMAT

Communication solutions for power utilities

DIMAT CAMT

MV Powerline
Communications
coupling unit

Maximize bandwidth, minimize space

Powerline Communications technology

Powerline Communications (PLC) give power utilities the opportunity to create a high-speed data transmission network using the existing medium- and low-voltage power lines.

With the use of DIMAT PLC solutions, power utilities can extend their communication backbone to any medium-voltage (MV) power lines, enabling the deployment of a broadband IP network without any civil works, rapidly and at very low installation cost.

Product information

DIMAT's CAMT coupling unit for Powerline Communications over MV lines is a highly compact unit combining both the coupling capacitor and coupling circuit in the same device. This device maximizes the communication bandwidth and optimizes impedance-matching between the MV line and the PLC equipment. High insulation ensures the complete safety and protection of the users and the communications equipment.

Applications for PLC networks

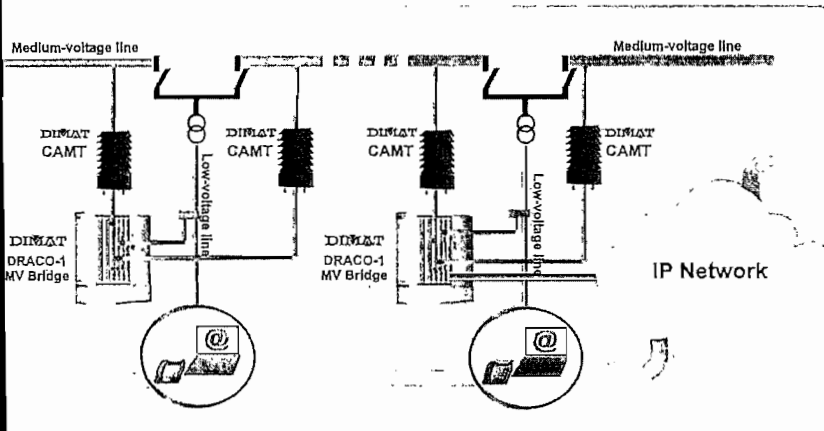
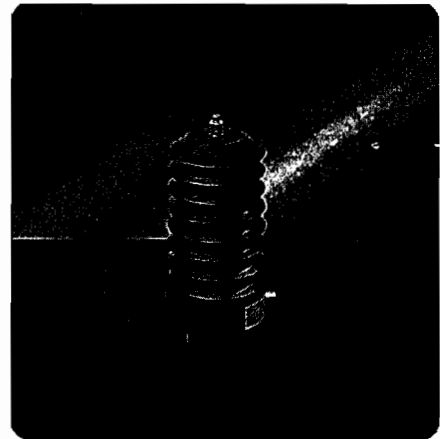
DIMAT's PLC solution offers great potential to electrical power utility companies. By providing them with high-speed telecommunication services, it enables them to offer their customers a broad spectrum of innovative services such as high-speed Internet, VoIP, and video and audio on-demand. It also enables the use of energy-related services to improve efficiency, such as AMR (Automatic Meter Reading), DSM (Demand-Side Management) and Distribution Automation (Telecontrol).

Key Features

- Compact design
- No maintenance requirement
- High safety
- Phase-to-earth capacitive coupling
- Transmission over power lines up to 24 kV
- Bandwidth from 2 to 38 Mhz
- Version for SF6 cells also available

Under development

- Transmission over 36 kV power lines



DIMAT CAMT Coupling unit - Technical Specifications	
Coupling type	Phase-to-earth by means of capacitor of 2 nF
MV power-line nominal voltage	24 kV (between phases)
Frequency range	2 - 38 MHz
Nominal impedance	
Equipment side	50 Ω (other under request)
Type	Unbalanced (Balanced under request)
Line side	20 Ω
Permanent average power	500 mW
Composite loss	≤ 3 dB in 2 MHz to 23 MHz band ≤ 4 dB in 23 MHz to 38 MHz band
Return loss (equipment side for 50 Ω)	≥ 10 dB in 2 MHz to 30 MHz band (line side for 20 Ω) ≥ 6 dB in 30 MHz to 38 MHz band (line side for 20 Ω)
Harmonic Distortion and intermodulation	≥ 60 dB
Drain coil	
Impedance at 50/60 Hz	$< 20 \Omega$
Current carried at 50/60 Hz	1 A _{rms} permanently 50 A _{rms} for 0,2 s (according to IEC 61334-3-22)
Gas surge arrester (line side)	
Nominal voltage	230 V
Discharge current (ISN)	20 kA (8/20 μ s)
Dielectric strength (50 Hz/1 min)	50 kV according to IEC 60358
Impulse voltage (1.2/50 μ s)	125 kV according to IEC 60358
Isolation resistance	$> 10 \text{ G}\Omega$
Transformer insulation	5 kVrms /1 min (according to IEC 61334-3-22)
Partial discharges	< 10 pC at 15 kV according to IEC 60358 ≤ 15 pC at 20 kV ⁽¹⁾
Operating and storage conditions	
Temperature and humidity	From -25 to $+55^\circ\text{C}$ and humidity relative from 10 to 100% in accordance with EN 60870-2-2 class C2 (climatogram 3K6)
Storage conditions	From -40 to $+70^\circ\text{C}$ and humidity relative from 10 to 100% in accordance with EN 60870-2-2 class C3 (climatogram 1K5)
Behaviour against ageing	In accordance with IEC 60932
Mechanical characteristics	
Connection to line	By means of M10 rod or M10 screw base of approx. 20 mm in depth
Connection to the communication terminal	By means of TNC connector
Connection to earth and fixing	By means of three M8 rods
Weight	5,1 kg
Dimensions	Height : 244 mm Diameter : 137 mm

¹ The measurement was carried out by putting an L-shaped metal grid connected to earth parallel to the unit axis at a distance of 30 cm from the CAMT coupling.

DIMAT



R-0153/2000

ISO 9001:2000

DIMAT continually strives to improve the quality and performance of its products and services. Consequently, technical information contained in this document is subject to change without prior notice.

05/2003

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visit our Web site at
www.dimat.com



Solutions
born from
experience

DIMAT

DIMAT DRACO-1

MV Powerline
Communications
bridge



**Highly compact,
highly configurable**

Communication solutions for power utilities

Powerline Communications technology

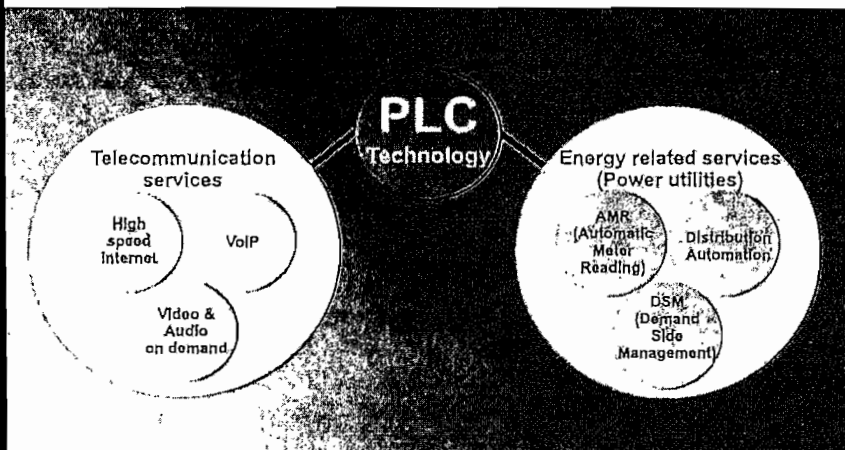
Powerline Communications (PLC) gives the opportunity to the power utilities to create a high-speed data transmission network using the existing medium and low voltage power lines.

This technology is based on the use of OFDM (Orthogonal Frequency Division Multiplexing) modulation. This multicarrier modulation has been optimized for the fast transmission of data over a network that was originally designed for power distribution.

With the use of DIMAT PLC solution, power utilities can extend their communication backbone to medium voltage power lines allowing deployment of broadband IP networks without any civil work, in a fast way and at very low installation cost.

Key Features

- Up to 135 Mbit/s per PLC link
- Quick and cost-effective implementation of IP networks
- Strong immunity to electromagnetic disturbances
- No maintenance required
- Availability of several network interfaces
- High reliability
- Easy configurability



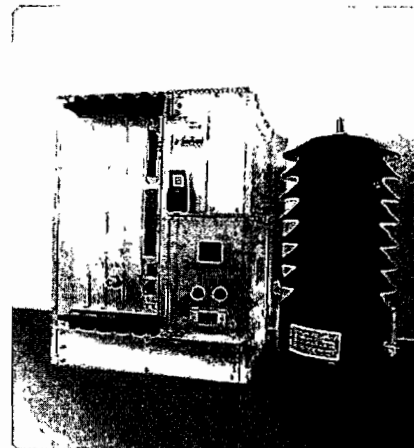
Product information

DIMAT DRACO-1 Medium-Voltage PLC Bridge is a compact, modular and flexible product. It is designed to implement meshed IP switching packet networks by exploiting the infrastructure of existing medium voltage networks.

DIMAT DRACO-1 technology provides extremely high data transmission speeds up to 45 Mbit/s per PLC module. DIMAT DRACO-1 can manage several MV and LV PLC modules; the maximum transit speed over an MV line is up to 135 Mbit/s when MV PLC modules are connected in parallel.

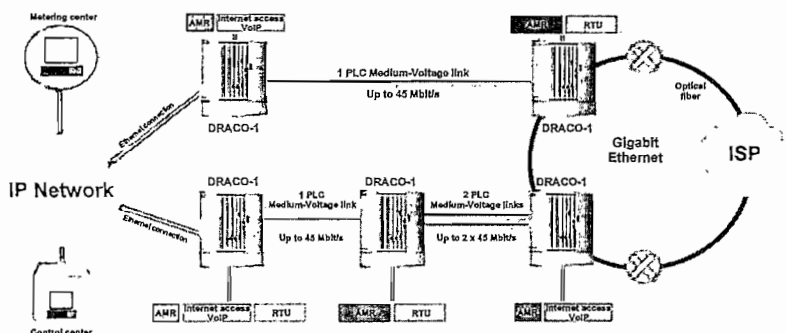
Applications for PLC networks

DIMAT's PLC solution offers great potential to power utility companies. By providing them with high-speed telecommunication services, it enables them to offer their customers a broad spectrum of innovative services such as high-speed Internet, VoIP, and video and audio on-demand... It also enables the use of energy-related services such as AMR (Automatic Meter Reading), DSM (Demand-Side Management) and Distribution Automation (Telecontrol).



Powerline Communications over medium-voltage lines

DRACO-1 bridge capabilities



DIMAT's complete PLC solution: DRACO-1 combined with CAMT coupling unit

Ensures a rapid and easy deployment of a wideband data network using existing MV power lines.

For more details on DIMAT's CAMT coupling unit contact us or visit our web site www.dimat.com

DIMAT DRACO-1 MV PLC bridge - Technical Specifications

Terminal configuration	
Five available slots for PLC and network interface modules	Medium Voltage (MV) Head End Medium Voltage (MV) CPE Low Voltage (LV) Head End Network interface
PLC Interface (MV or LV)	
Connector	Coaxial base
Media	RG-58
Impedance	50 Ω
Transmit Power Level	Programmable from -60 dBm up to +15 dBm
Minimum Receive Power Level	-60 dBm (dependent on noise level)
Frequencies	2 to 38 MHz
Modulation	OFDM (Orthogonal Frequency Division Multiplexing)
Typical Latency	< 3 ms
Maximum speed per PLC module	45 Mbit/s (18 upstream and 27 downstream)
Maximum speed per PLC link	135 Mbit/s (54 upstream and 81 downstream)
Network interface	
1000 Base-Fx (Gigabit Ethernet)	2 interfaces per module
Media	Monomode Optical Fiber
Wave length	1300 nm
Connector	LC
Transmission rate	1000 Mbit/s
User interface	
100Base-Tx	
Connector	RJ-45
Transmission rate	100 Mbit/s
VT100	
Serial channel	9600 bit/s, 1 stop, parity none, no flow control
Connector	RJ-45
Services	telnet FTP
Protocols	IPv4 SNMP (v2 and v3) DHCP (server and client) NTP
Operating system	Linux
Visual indications	Power supply failure Power supply OK
Operating conditions	
Temperature operating range	0°C / +55°C
Temperature range with no damage	-10°C / +65°C
Humidity	95%
Power Supply	90 – 264 V _{AC} Optional redundant power supply
Power Input frequency	47-63 Hz
Applicable Standards	
Equipment	
Electrical Safety	EN 60950
Radio Disturbance Emissions	EN 55022
ESD Susceptibility	EN 61000-4-2
Radiated Susceptibility	EN 61000-4-3
Power interface	
EFT/Burst	EN 61000-4-4
Input Surge	EN 61000-4-5
Conducted Disturbance	EN 61000-4-6
Dimensions	
Length	234 mm (Half 19" rack)
Length with mounting ears	269.64 mm
Height	309.8 mm (7 units)
Width	238.5 mm
Weight	~ 7 kg

DIMAT

DIMAT: A world of experience

DIMAT has 35 years of experience in the design and manufacture of communications and networking solutions for the power utilities market, worldwide. Our industry-leading reliability products range from digital and analog Power Line Carrier terminals and their accessories and digital and analog teleprotection terminals. All our products comply with IEC standards. We aim to become the most advanced company in the world in the power utility communication market. That's why we dedicate more than 30% of our workforce to Research and Development.

DIMAT: Quality assurance you can count on

At DIMAT, we take quality as seriously as you do. Our quality assurance program aims to bring you industry-leading quality in our products and services. DIMAT is ISO 9001:2000 certified. Quality is built into our products every step of the way.

DIMAT: Full life-time service

At DIMAT, we pride ourselves on the quality of our Customer Care. Our workforce of highly qualified professionals is dedicated to developing, maintaining, and implementing the best solutions for your needs.

When you contact DIMAT, you will always talk to the right in-house expert for your query. And we offer complete after-sales assistance during the full life cycle of our products.

Contact us to have all the information you need on our Powerline Communications solution

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DIMAT continually strives to improve the quality and performance of its products and services. Consequently, technical information contained in this document is subject to change without prior notice.

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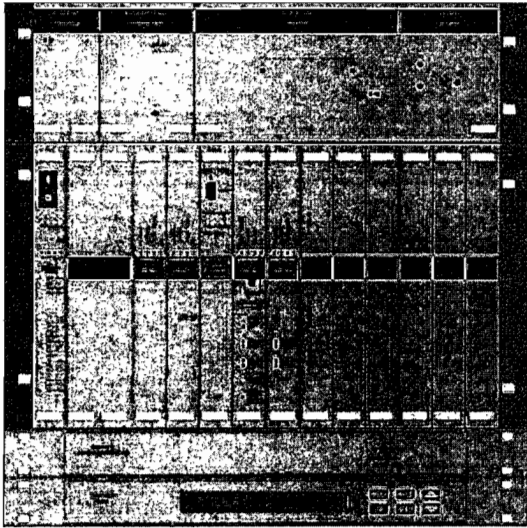
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DIGITAL PLC SYSTEM TYPE

OPD-2



GENERAL CHARACTERISTICS

The OPD-2 terminal is the DIMAT's solution for the cases on which digital PLCs are required but bandwidth congestion does not allow the OPD-1 terminal to be used.

This extremely versatile system can be integrated in the existing networks without any problem as it uses the same channeling as analogue PLCs and meets all the HF requirements of the IEC 495 standard.

The high immunity to the line noise and to the environmental disturbances make the OPD-2 suitable to work in the most extreme conditions.

The OPD-2 terminal is fully programmable by the user from a compatible PC. Its integrated supervision system allows the most important parameters of each terminal of a link, such as noise level, received pilot level, chronological list of alarms and so on, to be retrieved from any of the terminals of the link.

MAIN FEATURES

- Up to 6 speech and/or data channels in a 4+4 kHz
- Up to 12 speech and/or data channels in an 8+8 kHz
- 5, 20, 40 and 80W P.E.P. versions available
- Carrier frequency programmable from 40 to 508 kHz
- Optional 3 or 4-command built-in teleprotection system without reducing channel capacity

DIMAT

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TECHNICAL CHARACTERISTICS

GENERAL

Operation mode	QAM Modulation with triple frequency conversion by means single-side-band with suppressed carrier
Synchronization	By master-slave operation or Plesiochronous (no synchronization)
Basic bandwidth	4 kHz per channel
Net bit rate	28,000 bit/s for D version and 2 x 28,000 bit/s for DD version
Minimum SNR at Rx input for a BER better than 10 ⁻⁶ (AWGN)	30 dB
Frequency stability	±1ppm
Ageing	<1ppm / year
Automatic Gain Control (AGC) Dynamics	>55 dB with 10% pilot modulation
Programming and supervision system interface	RS-232C

HIGH FREQUENCY

Carrier-frequency range	From 40 kHz to 508 kHz, programmable in 1 Hz steps
Transmit and receive band	Erect or inverted, adjacent or non-adjacent
Nominal impedance	Selectable between 50, 75, 125 and 140 Ω. Other values on request
Bandwidth	4 + 4 kHz for D-type and 8 + 8 kHz for DD-type
Return loss	Better than 11 dB
Transmitter Peak Envelope Power over resistive load	5, 20, 40 or 80 W, depending on the version
Spurious emission	In accordance with IEC 495 cls. 5.2.4 and figures 7 and A.2
Sensitivity (minimum pilot level for AGC threshold)	-30 dBm
Selectivity	Higher than 65 dB at 300 Hz, and higher than 100 dB starting from 4 kHz, in accordance with IEC 495 cls. 5.3.1.5
Tapping loss	In accordance with IEC 495, figure 5

MULTIPLEXER

Number of ports	Up to 6 speech and/or data channels in D version and up to 12 speech and/or data channels in DD version
Speech ports	Bit rate 4800 or 6400 bit/s (MP-MLQ compression). Interface 4-wire E&M or DTMF, balanced 600 Ω Fax relay G3 in accordance with Rec. V.21, V.27ter and V.29 of the ITU-T Modem data relay V.22bis @ 2400 bit/s
Data ports	Interface In accordance with Rec. V.24/V.28 of the ITU-T (EIA RS-232C) 300 to 19200 bit/s asynchronous

OPERATING CONDITIONS

Temperature and humidity	From -5 °C to +45 °C and relative humidity not greater than 95%,(IEC 721-3-3 class 3K5)
Maximum temperature	+55 °C for a period no greater than 24 hours (IEC 495 cls 3.1)
Power supply	24, 48 or 110 Vdc ±20%. Others on request
Insulation, voltage withstand and electromagnetic compatibility	In accordance with: IEC 495 tables 2 and 3, IEC 255-4 (II and III), IEC 255-5, IEC 255-22-1 (II and III), IEC 801-2 (III), IEC 801-3, IEC 801-4 level 3
Maximum power consumption	100 to 360W, depending on the version

MECHANICAL CHARACTERISTICS

Storage conditions	In accordance with IEC 721-3-1, class 1K5
Weight	18 to 36 kg, depending on the version

Available versions

Output power	Up to 6 channels 4 + 4 kHz	Up to 12 channels 8 + 8 kHz
5W	OPD-205D	OPD-205DD
20W	OPD-220D	OPD-220DD
40W	OPD-240D	OPD-240DD
80W	OPD-280D	OPD-280DD

Power Line Communication

Network Management System

NMS500

Main Function

- **Provisioning:** configuring the system for a new customer
- **Monitoring:** monitoring all the components of the PLC network
- **Upgrading:** downloading new versions of the firmware
- **Billing** (*Available in version 2.0*)

The host is installed in the Network Operating Center (NOC) of the operator with a good response time connection to the PLC equipment. NMS-500 is build up with five independent modules linked together through a database. Each module provides different functions.

Function Provisioning

This function is provided by the "Deployment Manager". These modules enable the operator to declare modify or delete: Master, CPE and End User Customer fields into the Database. The entry can be done:

- Through an interactive way (using dedicated dialog box)
- By importing spreadsheet generated files

When a new device is entered or modified, it is directly taken into account by the other modules, and all the necessary modifications are operated into the required devices.

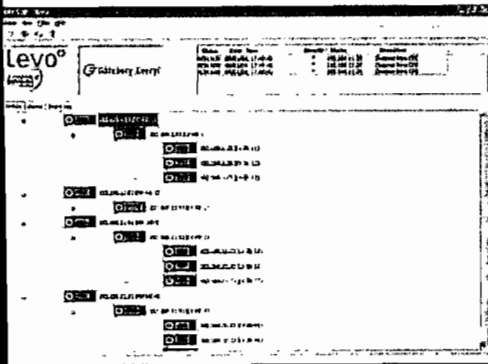
Function Monitoring

This function is provided by the "Graphical User Interface". This module enables the operator to monitor the PLC network devices using 3 screens:

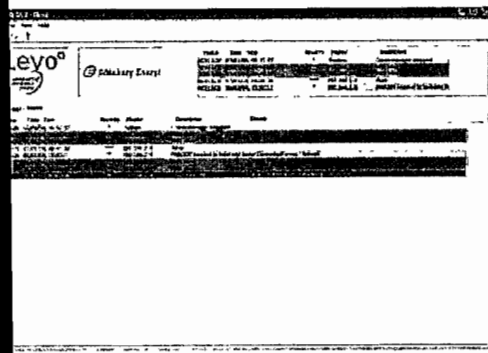
- **"Typology view":** graphically displays all the HE and IR of the PLC Network (*). CPE information can be access through a detail view of each master.

- **"Alarms list window":** dynamically displays all the alarms that have appeared and have not been acknowledged by the operator. Alarm list includes "connectivity test", "data-rate threshold", and "change of configuration".

- **"Event log window":** displays all the occurrences of the alarms. The operator can apply filters and sorting method to analyze the whole story of an event. Events are also exported as CSV file for spreadsheet treatment.



Typology view"



alarms list window"



"Event log window"

(*Icons easily show if devices are in normal, warning or default state: part of the tree can be hide or expanded to have a global view of the network or to focus on a particular cells.



Function Upgrading

This function is provided by the "Release Upgrading Manager". This module enables the operator to:

- Specify where is located the image file of a new firmware release (on a FTP server)
- Select all the masters which require this new release
- Send to each master a request for upgrading, and ensure that the upgrade has been done. This treatment is done in parallel process to treat a great amount of PLC modems.

Function Communication

All the communications to the PLC devices are driven by the "Comm manager" module. This module uses standard protocols: SNMP V2c and Telnet.

It is possible to customize NMS500 according to 2 directions:

- The Logo of the operator can be inserted into the GUI (using a simple BMP file).
- Extra software can be called from NMS500 by clicking on the right contextual menu of the master (the extra software will thus be displayed into the contextual menu, and will be invoked with the IP address of the master passed as an argument).

This customization can be done on site by the operator without any modification of the NMS500 programs themselves.

Performances

On a single PC architecture, all the modules and the database are installed on the same platform. This solution is able to control medium-size sites (less than 500 points). Beyond this point it may be necessary to distribute the system on different host, one host should be dedicated to the Database and the communication manager, other hosts can be used for monitoring and for deployment. By using different "Groups" of PLC devices, several operators can work on the network without interfering.

Number of Alarms and Events

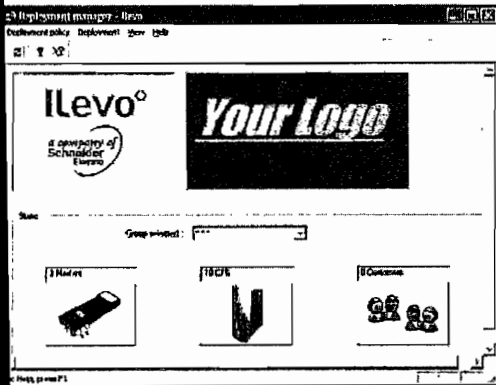
The severity of an alarm can be "Default" or "Alarm". The number of events stored is limited in a "First In First Out" policy.

Response time

The response time of the system depends on the setting of the Comm manager. These settings must be adapted to the access network response time.

Hardware recommended

Pentium III min 800MHz
Ethernet port 10/100 base T
Operating system : Win2000 or Win XP.
HD used: 10 Mo for executables 100 Mo for Database (100 points)
RAM : 256Mo for WinXP, 128Mo for Win2000
The Database used is Jet (included in window distribution). No other software is necessary.
The protocols used are: Telnet and SNMP V2c



Power to communicate

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Communications
EPC)

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Pictures: Schneider Electric
Printing:

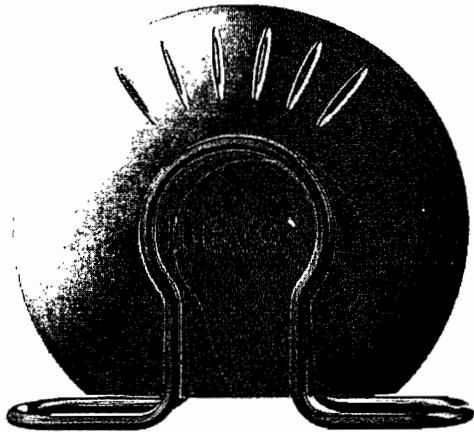


Power Line Communication

ILV201 Data CPE Modem

Solutions for broadband communication infrastructures using electrical networks

evo Customer premises equipment (CPE)
End-user modem
Professional and residential use
DS2 200 Mbps
Wisconsin PLC technology



Main Function

- Ethernet 10/100 Mbps/PLC bridge
- DS2 Wisconsin 9010 chipset inside

Main Benefits

- Small size
- Embedded power supply
- Telco or ISP logo on request

Requirements

- PLC network for access point application

Application

- Local Loop last mile access point
- LAN networking
- In-home networking

Services

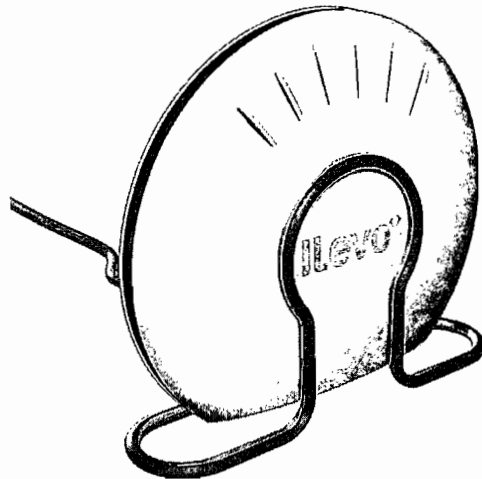
- High-speed Internet

Package Content

- Data Modem
 - Power cable
 - Ethernet cable
 - User manual - in English*
- * Other language on request

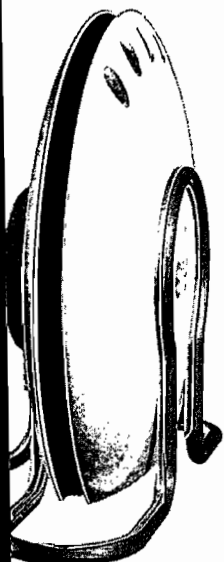
Installation

- Located on desk top close to user's appliance (computer, phone set, etc.)
- Connected to both power outlet selected by the client and customer computer
- "Plug and play" set up



UNIFIED IP PLATFORM
FOR BOTH MULTIMEDIA & ENERGY APPLICATIONS
OVER EXISTING POWER GRID

Specifications



Chipset	
DS2 Wisconsin chipset inside	
Data rate	Up to 200 Mbps through the powerline Interface
Physical Layer	
Modulation	OFDM with 1536 carriers uplink/downlink, symmetrical, up to 10 bit per symbol adaptive per carrier.
Transmission Power Step	1 dB
PSD (Power Spectral Density)	> - 56 dBm/Hz
Programmable transmission gain	33dB and 21dB
Programmable reception gain	-12dB down to +30dB, in 6dB steps
Dynamic Range	90 dB min
Protocols Layer 2	
MAC	In-Home MAC for small LAN networks. LV Access for large LAN networks Master slave mechanism.
Dynamic QoS	Configuration using service classifier
Spanning Tree Protocol	IEEE 802.1D
VLAN	IEEE 802.1Q, Up to 16 active VLANs in LV interface
Traffic Prioritization	IEEE 802.1p
Clock synchronization	NTP
Security Aspects	
Authentication	CPE LMAC addresses are registered in masters to prevent from unauthorized intrusion. Compliant with RADIUS protocol.
Separation at Layer 2	Ilveo devices support VLANs based on the IEEE 802.1Q standard protocol.
Separation at physical layer	The communication between one CPE and the master relies on specific coding preventing other CPE from decoding the signal.
Configuration & Management	
Remote management of all Ilveo modems is made via standard SNMP protocols.	
MIB Version	MIB III IETF RFC1213, 1493, 2674
SNMP	Supports SNMP v2c
Provisioning	IP configuration by DHCP FTP client, configuration and upgrade files by TFTP
Interoperability with routers and other network devices such as DNS servers, DHCP servers, and boot servers are handled via standard protocols.	

Physical Features	
Weight	TBD
Dimensions	TBD
Color	TBD
Material	Plastic TBD
Ports & Connectors	1 IEC EN60 320-1 1 Ethernet RJ45 port
Status indicators (LEDs)	Power, Diagnostic (TBD), Data, Link
Electrical Characteristics	
Power Consumption	TBD
Voltage	100-240V
Frequency	50/60Hz
Environmental	
Ingress Protection (IP)	IP21
Acoustic Noise	Less than 25dB(A) as ILV201 does not use any fan.
Operating	
Operating environment	IEC 60721-3-3 standard: - 3K3 (Schneider Standard FT15005 Category C1)
Relative humidity	5% to 85% non-condensing
Ambient operating temperature	+5 to +40°C with 100% performance -5 to +40°C without damage
Storage	
Storage environment	According to ETS300019-1-1 Class 1.1
Relative humidity	5% to 95% non-condensing
Temperature	-5 to +45°C
Transport	
Transport environment	According to ETS300019-1-2 Class 1.2
Relative humidity	95% non-condensing
Temperature	-40 to +70°C
CE Approval and labels	
EMC	EN 55 022:1994 Class B, EN 55 024:1998 prEN 50 412-1
Safety	EN 60950-1:2001
Labels	Modem labeled with PLC MAC address, USB MAC address and serial number.

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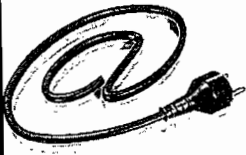
Publication: SEPC
Pictures: SEPC



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Communications (SEPC)

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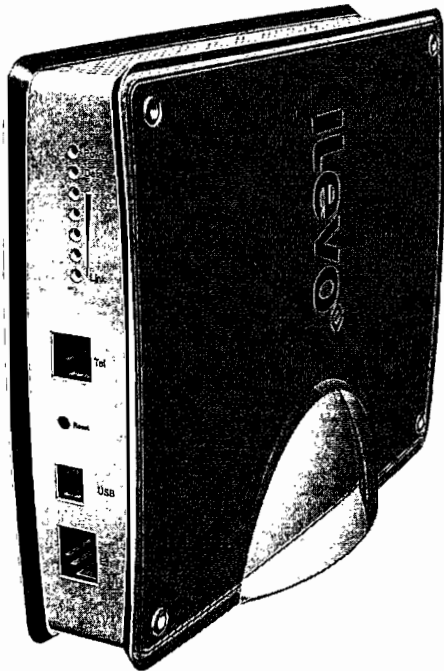


Power Line Communication

ILV220 Data & VoIP CPE Modem

Solutions for broadband communication infrastructures using electrical networks

evo Customer remises equipment (CPE)
End-user modem
Professional and residential use
DS2 200 Mbps
Wisconsin PLC technology



Main Function

- Ethernet/PLC bridge
- DS2 Wisconsin 9001 chipset inside

Main Benefits

- Small size
- Embedded power supply
- Various colors on request
- Home environment look and feel
- Telco or ISP logo on request

Requirements

- PLC network for access point application
- USB cable and drivers are not recommended but available on request
- Analogue telephone only
- Standard PC and MAC

Application

- Local Loop last mile access point
- LAN networking

Services

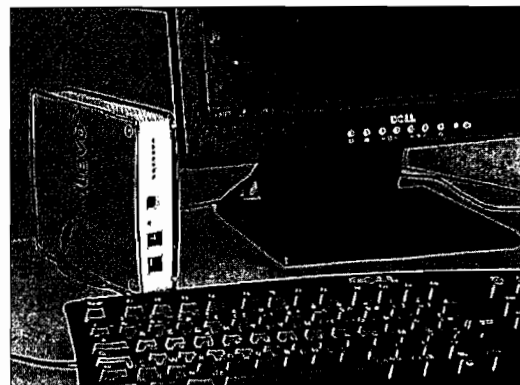
- High-speed Internet
- Telephony using embedded Voice-over-IP (VoIP)
- Video services using video streaming over IP
- Voice-Data-Image (VDI) compliant

Package Content

- Data & VoIP Modem
- Power cable
- Phone cable
- Ethernet cable
- User manual - in English*
- * Other language on request

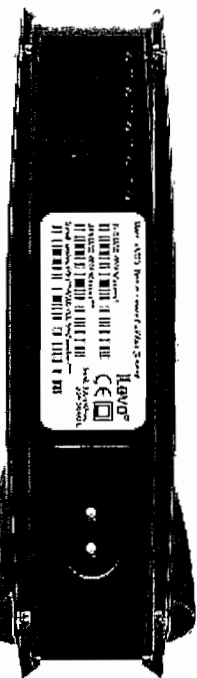
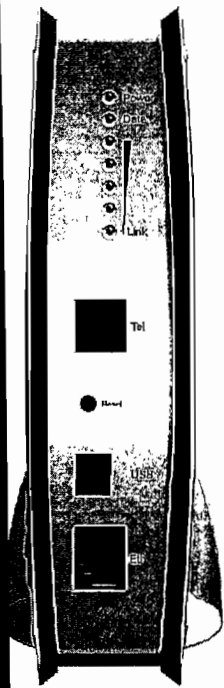
Installation

- Located on desk top close to user's appliance (computer, phone set, etc.)
- Connected to both power outlet selected by the client and customer computer
- "Plug and play" set up
- Led indicators to show the conditions of both PLC signal from the power line and connected equipment on the end user side.



**UNIFIED IP PLATFORM
FOR BOTH MULTIMEDIA & ENERGY APPLICATIONS
OVER EXISTING POWER GRID**

Specifications



Chipset	
DS2 Wisconsin chipset inside	
Data rate	Up to 200 Mbps through the powerline interface
Physical Layer	
Modulation	OFDM with 1536 carriers uplink/downlink, symmetrical, up to 10 bit per symbol adaptive per carrier.
Transmission Power Step	1 dB
PSD (Power Spectral Density)	≤ -50 dBm/Hz
Programmable transmission gain	33dB and 21dB
Programmable reception gain	-12dB down to +30dB, in 6dB steps
Dynamic Range	90 dB min
Protocols Layer 2	
MAC	In-Home MAC for small LAN networks. LV Access for large LAN networks Master slave mechanism.
Dynamic QoS	Configuration using service classifier
Spanning Tree Protocol	IEEE 802.1D
VLAN	IEEE 802.1Q, Up to 4094 VLAN_ID Up to 256 active VLANs in LV interface
Traffic Prioritization	IEEE 802.1p
Clock synchronization	NTP
Voice-over-IP	ITU-T H.323 Version 4 compliant H.450, including supplementary services.1, 2, 4, 7, H.245 Version 8, H.245 tunneling, H.225 Version 4, Caller ID through Q.931 messages H245 User Input Indication for out-of-band DTMF signaling G.711 (A-law and u-law), G.723.1, G.726 and G.729A/B
Security Aspects	
Authentication	CPE LMAC addresses are registered in masters to prevent from unauthorized intrusion. Compliant with RADIUS protocol.
Separation at Layer 2	Ilveo devices support VLANs based on the IEEE 802.1Q standard protocol.
Separation at physical layer	The communication between one CPE and the master relies on specific coding preventing other CPE from decoding the signal.

Configuration & Management	
Remote management of all Ilveo modems is made via standard SNMP protocols.	
MIB Version	MIB II/ IETF RFC1213, 1493, 2674
SNMP	Supports SNMP v2c
Provisioning	IP configuration by DHCP FTP client, configuration and upgrade files by TFTP
Interoperability with routers and other network devices such as DNS servers, DHCP servers, and boot servers are handled via standard protocols.	
Physical Features	
Weight	730 grams
Dimensions	200x160x70 mm
Color	Transparent (by default), blue, yellow, red on request.
Material	Central enclosure; ABS, F20, GR, Cyclocac, GE Flammability class V1 Side covers; PMMA, 8N, BK, RÖHM, BEGUSSA Flammability class HB
Ports & Connectors	1 IEC EN60 320-1 1 Ethernet RJ45 port 1 USB 1.0/1.1 1 RJ-11 telephone interface
Status Indicators (LEDs)	Power, Data, Power line quality, Link
Electrical Characteristics	
Power Consumption	8 W typical 13 W max
Voltage	85-265V
Frequency	50/60Hz
Environmental	
Ingress Protection (IP)	IP20
Acoustic Noise level	Less than 25dB(A) as ILV220 does not use any fan.
Operating	
Operating environment	According to ETS300019-1-3 Class 3.1
Relative humidity	5% to 85% non-condensing
Ambient operating temperature	0 to +40°C with 100% performance -5 to +55°C without damage
Storage	
Storage environment	According to ETS300019-1-1 Class 1.1
Relative humidity	5% to 95% non-condensing
Temperature	-5 to +45°C
Transport	
Transport environment	According to ETS300019-1-2 Class 1.2
Relative humidity	95% non-condensing
Temperature	-40 to +70°C
CE Approval and labels	
EMC	EN 55022:1994 Class B, EN 55 024:1998
Safety	EN 60950-1:2001
Labels	Modem labeled with PLC MAC address, USB MAC address and serial number.

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Publication: SEPC
Pictures: SEPC





Power Line Communication

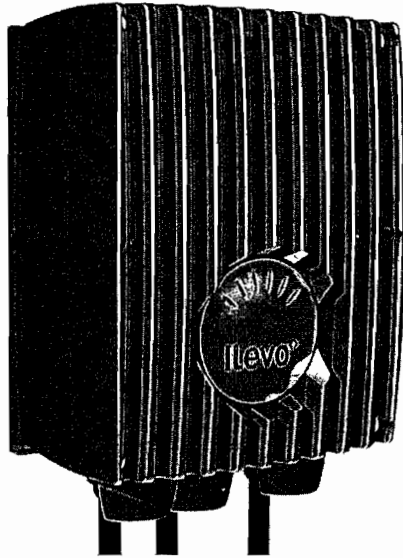
Intermediate Repeater

- ILV2110 Time Division
- ILV2120 Frequency Division

Solutions for broadband communication infrastructures using electrical networks

Application

- Local loop repetition point
- Intended for 400/230 volts
- Last mile access network



Services

- Transparent repetition of Head End services
- Time division repetition, ILV2110
- Frequency division repetition, ILV2120

Installation

- Street cabinets
- Meter rooms
- Distribution substations

Package Content

- Repeater

Optional Accessories

- Capacitive Coupling Unit
- Inductive Coupling Unit
- Signal Distribution Box

Levo Intermediate Repeater
Specifically designed for electrical networks' environment
Used to extend the range of PLC network DS2 200 Mbps
Wisconsin PLC technology

Main Function

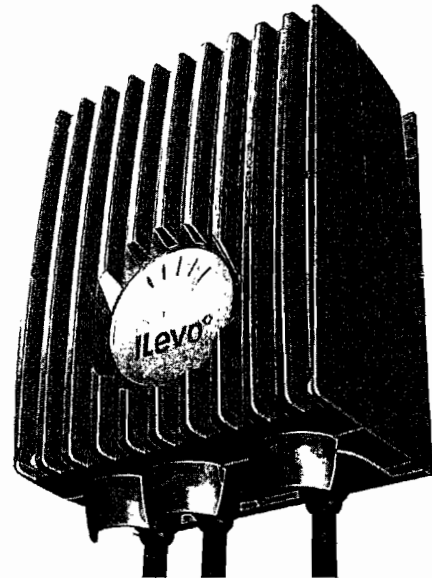
- Low voltage repeater
- DS2 Wisconsin 9002 chipset inside

Main Benefits

- Small size, Open PLC European Research Alliance (OPERA) compliant
- Ethernet interface for local management
- Built in low-pass and high-pass filter
- Easy installation without power off
- Possibility to security seal the product
- Modular units for TDD and FDD

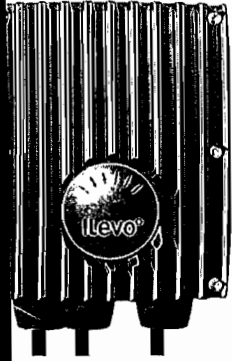
Requirements

- DS2 Wisconsin PLC network
- Autoconfiguration servers SNMP, RADIUS, FTP, NTP



*UNIFIED IP PLATFORM
FOR BOTH MULTIMEDIA & ENERGY APPLICATIONS
OVER EXISTING POWER GRID*

Specifications



Chipset	
DSS9002	Forwarding table: max 1024 MAC addresses Active PLC connections: 64
Data rate	Up to 200 Mbps
Physical Layer	
Modulation	OFDM with 1536 carriers uplink/ downlink, symmetrical, up to 10 bit per symbol adaptive per carrier.
Transmission Power Step	1 dB
PSD (Power Spectral Density)	46dBm/Hz @ 10MHz bandwidth 49dBm/Hz @ 20MHz bandwidth 50dBm/Hz @ 30MHz bandwidth
Programmable transmission gain	33dB and 21dB
Programmable reception gain	-12dB down to +30dB, in 6dB steps
Dynamic Range	90 dB min
Protocols Layer 2	
Mac	LV Access for large LAN networks Master-slave mechanism
Dynamic QoS	Configuration using service classifier
Spanning Tree Protocol	IEEE 802.1D
VLAN	IEEE 802.1Q
Traffic Prioritization	IEEE 802.1p
Clock synchronization	NTP
Security	
Authentication	LMAC addresses are optionally authenticated using RADIUS to prevent unauthorized intrusion.
Separation at layer 2	Ilevo devices support VLANs based on the IEEE 802.1Q standard protocol.
Separation at physical layer	The communication between one IR and the master relies on specific coding preventing from decoding the signal.
Configuration & Management	
Remote management of all Ilevo equipment is made via standard SNMP management.	
MIB Version	MIB II/ IETF RFC1213, 1493, 2674
SNMP	Supports SNMP v2c
Interoperability with routers and other network devices such as DNS servers, DHCP servers, and boot servers are handled via standard protocols.	

Physical Features	
Weight	Approx 2.5kg
Dimensions	Approx 190x150x80 mm
Color	Ilevo grey, RAL 7030
Material	Aluminum, 6063 HC
Ports & Connectors	2 coupler interfaces 1 RJ45 10/100BASE-T
Status indicators (LEDs)	Power, Status, PLC Link, PLC Act
Electrical Characteristics	
Power Consumption	Max 15W
Voltage	100-240VAC
Frequency	50/60Hz
Environmental	
Ingress Protection (IP)	IP54
Acoustic Noise level	Fan less. Less than 25dB(A)
Operating	
Operating environment	IEC 60721-3-3 standard: - 3K3 (Schneider Standard FT15005 Category C2)
Relative humidity	10% to 100% non-condensing
Ambient operating temperature	-25°C to 40°C -25°C to 55°C in restricted areas according to EN 60950/FT15005C2
Storage	
Storage environment	According to ETS 300 019-1-1 Class 1.1
Relative humidity	5% to 95% non-condensing
Temperature	-5°C to +45°C
Transport	
Transport environment	According to ETS 300 019-1-2 Class 2.3
Relative humidity	95% non-condensing
Temperature	-40°C to +70°C, < 30days
CE Approval and labels	
EMC	EN55022 class B EN55024 prEN50412-1 type 2, class 1
Electrical safety	EN 60950
Labels	Repeater labeled with Product number, MAC address, and serial number

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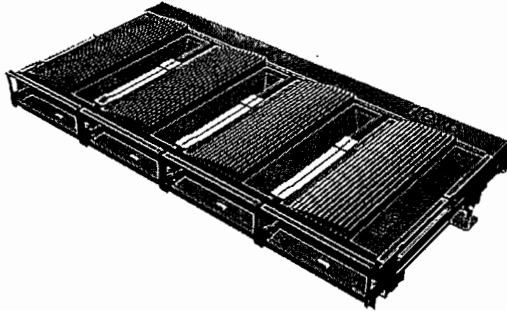
Publication: SEPC
Pictures: Schneider Electric





Power Line Communication Transformer Equipment (TE) System

Solutions for broadband
communication
infrastructures using
electrical networks



**Levo Transformer
Equipment**
Specifically designed
for electrical networks
DS2 200 Mbps
Wisconsin PLC
technology

*Industrial rack in three versions
covers all applications*

- Modular design with standard units
- Two interface units for fibre or backbone access
- One power supply suits all configuration

Main Function

- Repeating capability
- DS2 Wisconsin chipset inside

Main Benefits

- Small size
- Modular philosophy for smart use (upgrade, maintenance,...)

Requirements

- PLC network for access point application

Application

- Ethernet compatible master modem
- Intended for Low & Medium Voltage networks

Services

- Management of all units, SNMP support
- High-speed Internet access over existing power lines up to 200 Mbps.
- 802.1Q VLAN & Optimized VLANs

Installation

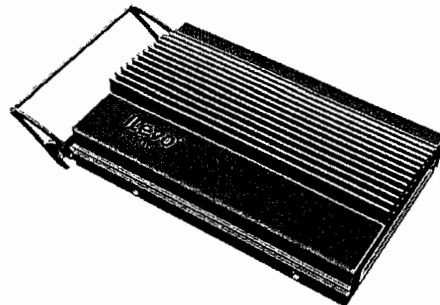
- Located in distribution substations, cable cabinets or meter rooms.

Package Content

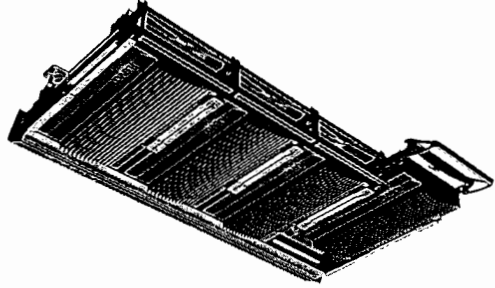
- Module and backplane's type depending on configuration, please refer to configuration table for precise definition

Optional Accessories

- Capacitive Coupler
- Inductive Coupler
- Signal Distribution Box



*UNIFIED IP PLATFORM
FOR BOTH MULTIMEDIA & ENERGY APPLICATIONS
OVER EXISTING POWER GRID*



ILV22B3 with ILV22P1 power supply, ILV22M2 module and two ILV22M3

Configuration Recommendations

Type of Modules	Type of Backplane			Type of Modules		
	ILV22B1	ILV22B2	ILV22B3	ILV22P1	ILV22M2	ILV22M3
MV Master Head-End (Gigabit Interface)	1			1		1
MV Master Head-End (Gigabit Interface in ring architecture)		1			1	
MV Master Head-End (fast Ethernet Interface)	1			1		
MV Slave Head-End (fast Ethernet Interface)	1			1		
MV Repetition only in TDD mode	1			1		
MV Repetition only in FDD mode		1			1	
MV Head-End (Gigabit Interface) with LV distribution			1			1
MV Head-End (Gigabit Int. in ring architecture) with LV distribution		1			1	
MV Head-End (fast Ethernet Interface) with LV distribution	1			1		
MV Repetition (TDD) with LV distribution		1			1	
MV Repetition (FDD) with LV distribution			1			1
LV Distribution only	1					

Specifications

Physical Features		
Weight	Dimensions (ground pin excluded)	Color
0.9kg	232x215x48	Ilavo grey, RAL 7030
1.4kg	346x215x48	Ilavo grey, RAL 7030
1.8kg	460x215x48	Ilavo grey, RAL 7030
Connectors		
Ingress Protection (IP) in accordance with weather protected areas such as transformer premises		
IP21	IP21	IP21
Status indicators (LEDs)		
TX Powerline, Link Po-worline, Link Backplane 1/2, TX_Eth 1/2, Link Eth 1/2	TX Powerline, Link Po-worline, Link Backplane 1/2, TX_Eth 1/2, Link Eth 1/2	TX Powerline, Link Po-worline, Link Backplane 1/2, TX_Eth 1/2, Link Eth 1/2
Connectors		
Ingress Protection (IP) in accordance with weather protected areas such as transformer premises		

Specifications

Modules		ILV22M2		ILV22M3	
Description	Power Supply	Ethernet Module	Gigabit Module	Chipset	Data rate
	ILV22P1	ILV22M2	ILV22M3	DSS9002	Up to 200 Mbps through the powerline port
Physical Features					
Weight	0.8kg	195x110x48	195x110x48		
Dimensions ("locked")	Ilavo grey, RAL 7030	Ilavo grey, RAL 7030	Ilavo grey, RAL 7030		
Material	Aluminium	Aluminium	Aluminium		
Ports & Connectors					
IEC power connector, +12V Auxiliary Input, Backplane connector, RJ45 10/100 Ethernet Powerline connector, Cisco Backplane connector, Backplane connector, PLC Tx/Rx activity, PLC link, PLC RvTx activity, Backplane link (2)		PLC link, PLC RvTx activity, Backplane link (2)	Gigabit Ethernet port link (2), Backplane link (2), RJ4Tx (2)		
Physical Layer					
Transmission Power Step	-	1 dB	1 dB		
PSD (Power Spectral Density)	-	≤ -50 dBm/Hz	≤ -50 dBm/Hz		
Programmable reception gain	-	-12dB down to +30dB, in 6dB steps	-12dB down to +30dB, in 6dB steps		
Dynamic Range	-	90 dB min	90 dB min		
Electrical Characteristics					
Power Consumption (max)	40W	8W	8W		
Input Voltage (PSU only)	115Vac/230Vac				
Input Frequency (PSU only)	60Hz/50Hz				
Environment					
Relative humidity	20% to 95% non-condensing	20% to 95% non-condensing	20% to 95% non-condensing		
Ambient operating temperature	In accordance with protected areas such as transformer premises	In accordance with protected areas such as transformer premises	In accordance with protected areas such as transformer premises		
CE Approval					
EMC	EN55022 class A	EN55024	EN55022 class A	EN55024	EN55024
Electrical safety	EN 60950-1:2001				

The "dummy" module ILV22M0 is similar in external appearance to the ones described above, but it has no modern card inside. The front panel cover has no opening for connectors. The module is used to provide protection to components that would be exposed otherwise.

ILV22M0

ANEXO B

Formato Encuestas

FORMULARIO DE ENCUESTA USUARIOS COMERCIALES.....	389
FORMULARIO DE ENCUESTA USUARIOS RESIDENCIALES.....	391

**ESCUELA POLITECNICA NACIONAL
ELECTRÓNICA Y REDES DE INFORMACIÓN**

FORMULARIO DE ENCUESTA USUARIOS RESIDENCIALES

OBJETIVO: Esta encuesta servirá para determinar la factibilidad de instalar un sistema para acceso a Internet de Banda Ancha, usando una nueva tecnología que utiliza la red eléctrica para transmitir los datos en lugar de la línea telefónica o el cable-modem. Por favor responda con total honestidad.

Marque la respuesta correcta con una "x"

1. Que edad tiene usted: _____

2. En que sector vive:

Norte Centro Sur

3. ¿Utiliza usted o algún otro miembro de su hogar el Internet?

Sí No

Si no utiliza Internet termine la entrevista, gracias por su tiempo

4. ¿Cuántos computadores hay en su hogar?

0 1 2 3

--	--	--	--

Si no tiene computador marque 0 y termine la entrevista, gracias por su tiempo

5. ¿Ha escuchado del Internet por medio de la red eléctrica?

Sí No

6. En que lugares accede usted o algún miembro de su hogar al Internet:

(Puede seleccionar varias opciones)

- En el trabajo
- En un café-net
- En mi casa
- Otros (Especifique): _____

7. ¿Cómo accede al Internet en su hogar?

- Utilizando la línea telefónica
- Mediante un servicio de Banda Ancha
- No uso el Internet en mi casa
- Otros (Especifique): _____

8. Indique que proveedor de Internet tiene en su Hogar

- Interactive
- Impsat
- SatNet
- No lo recuerdo
- No tengo Internet en el Hogar
- Otro (Especifique): _____

9. El nivel de Satisfacción que usted recibe de su proveedor de Internet es:

- Alto
- Regular
- Bajo
- Pésimo

**ESCUELA POLITECNICA NACIONAL
ELECTRÓNICA Y REDES DE INFORMACIÓN**

10. ¿Cuáles son los problemas más frecuentes que tiene con su proveedor de Internet?
- La velocidad
 - La seguridad de la información
 - La movilidad
 - El Soporte técnico
 - No tengo servicio de Internet al momento
 - Otro (Especifique): _____

11. ¿Qué es lo que usted espera de su proveedor de Internet?
(Seleccione dos opciones)
- Buen precio
 - Alta velocidad
 - Buen soporte técnico
 - Seguridad de la información
 - Movilidad
 - No sé
 - Otro (Especifique): _____

12. ¿Si tiene servicio de Internet en su hogar, qué precio paga mensualmente?
(Solo el precio de Internet, mas no del servicio de teléfono)

Menos de \$52															
	\$53-\$56	\$57-\$60	\$61-\$64	\$65-\$68	\$69-\$72	Más de \$73									
<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> </tr> </table>															

13. ¿Qué tan interesado estaría usted en adquirir Internet con Banda Ancha por la red eléctrica?

Sí lo compraría	No lo compraría	Necesito más información
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Si su respuesta es no lo compraría por favor indique las razones para su respuesta

14. ¿Que precio estaría dispuesto a pagar por un servicio de Internet de calidad, utilizando la red eléctrica en lugar de la línea telefónica?

Gracias por su tiempo

**ESCUELA POLITECNICA NACIONAL
ELECTRÓNICA Y REDES DE INFORMACIÓN**

FORMULARIO DE ENCUESTA USUARIOS COMERCIALES

OBJETIVO: Esta encuesta servirá para determinar la factibilidad de instalar un sistema para acceso a Internet de Banda Ancha, usando una nueva tecnología que utiliza la red eléctrica para transmitir los datos en lugar de la línea telefónica o el cable-modem. Por favor responda con total honestidad.

Marque la respuesta correcta con una "x"

1. En que sectores se encuentra locales de su organización:

Norte Centro Sur

2. ¿Cuántos computadores hay en su organización?

Menos de 5 De 5 a 10 De 10 a 50 De 50 a 100 Más de 100

--	--	--	--	--

3. ¿Ha escuchado del Internet por medio de la red eléctrica?

Sí No

4. ¿Cómo accede al Internet en su trabajo?

- Utilizando la línea telefónica
- Mediante un servicio de Banda Ancha
- Mi organización no utiliza servicios de Internet
- Otros (Especifique): _____

5. Indique cual es el proveedor de Internet de su Compañía

- Interactive
- Impsat
- SatNet
- Andinanet
- Otro (Especifique): _____

6. El nivel de Satisfacción que usted recibe de su proveedor de Internet es:

- Alto
- Regular
- Bajo
- Pésimo

7. ¿Cuáles son los problemas más frecuentes que tiene con su proveedor de Internet?

- La velocidad
- La seguridad de la información
- La movilidad
- El Soporte técnico
- No tengo servicio de Internet al momento
- Otro (Especifique): _____

**ESCUELA POLITECNICA NACIONAL
ELECTRÓNICA Y REDES DE INFORMACIÓN**

8. ¿Qué es lo que usted espera de su proveedor de Internet?

(Seleccione dos opciones)

- Buen precio
- Alta velocidad
- Buen soporte técnico
- Seguridad de la información
- Movilidad
- Otro (Especifique): _____

9. ¿Si tiene servicio de Internet en su Compañía, qué precio paga mensualmente?

(Solo el precio de Internet, mas no del servicio de teléfono)

Menos de \$52	\$53-\$56	\$57-\$60	\$61-\$64	\$65-\$68	\$69-\$72	Más de \$73
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. ¿Qué tan interesado estaría usted en adquirir Internet con Banda Ancha por la red eléctrica?

Sí lo compraría	No lo compraría	Necesito más información
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

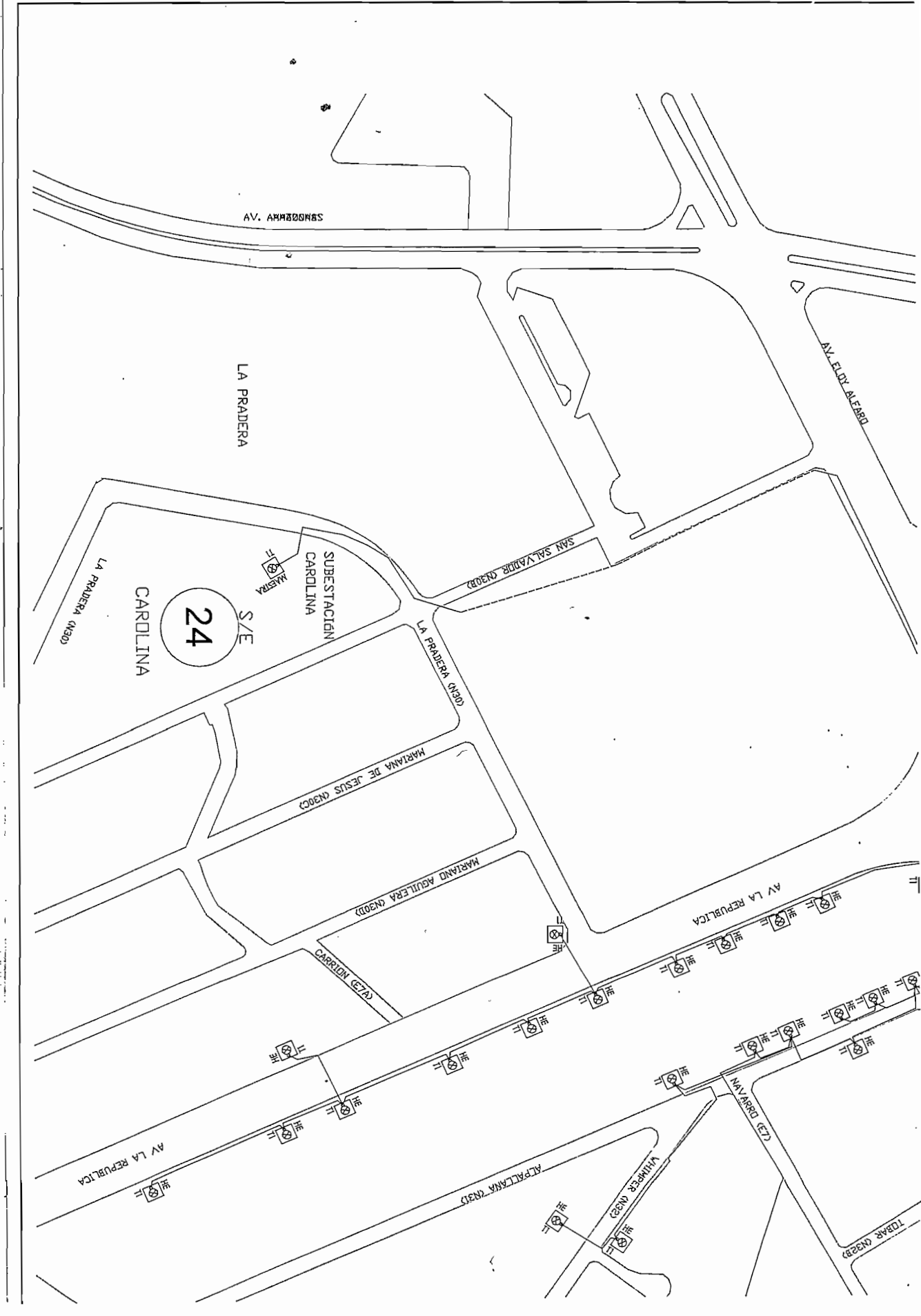
Si su respuesta es no lo compraría por favor indique las razones para su respuesta

11. ¿Que precio estaría dispuesto a pagar por un servicio de Internet de calidad, utilizando la red eléctrica en lugar de la línea telefónica?.

Gracias por su tiempo

ANEXO C

Planos de la red de acceso *Broadband PLC*



AV. AMBROSIO

LA PRADERA

AV. EL D. ALVARO

24
S/E
CARDOLINA

SUBESTACION
CARDOLINA

LA PRADERA Q1300

SAN SALVADOR Q300

LA PRADERA Q1300

MARIANA DE JESUS Q300

MARIANO AGUIRRE Q300

CARRILLO Q700

AV. LA REPUBLICA

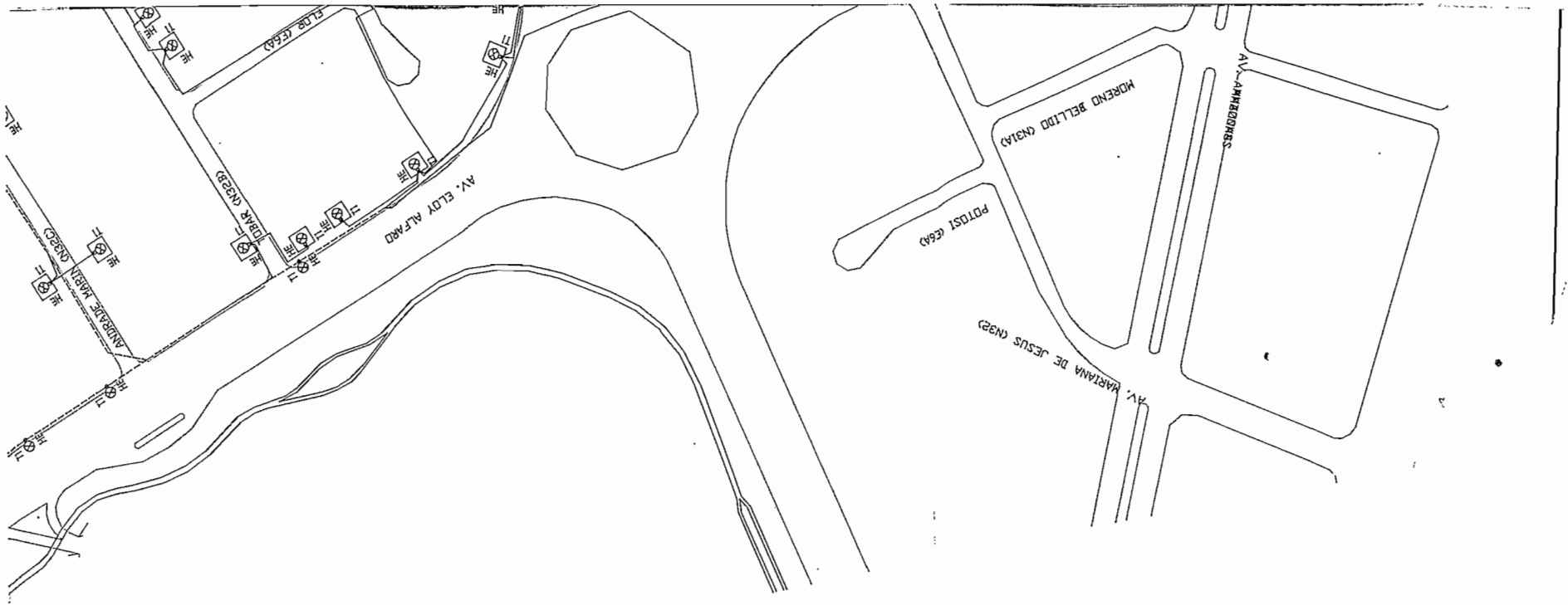
AV. LA REPUBLICA

ALPALTAMA Q300

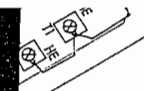
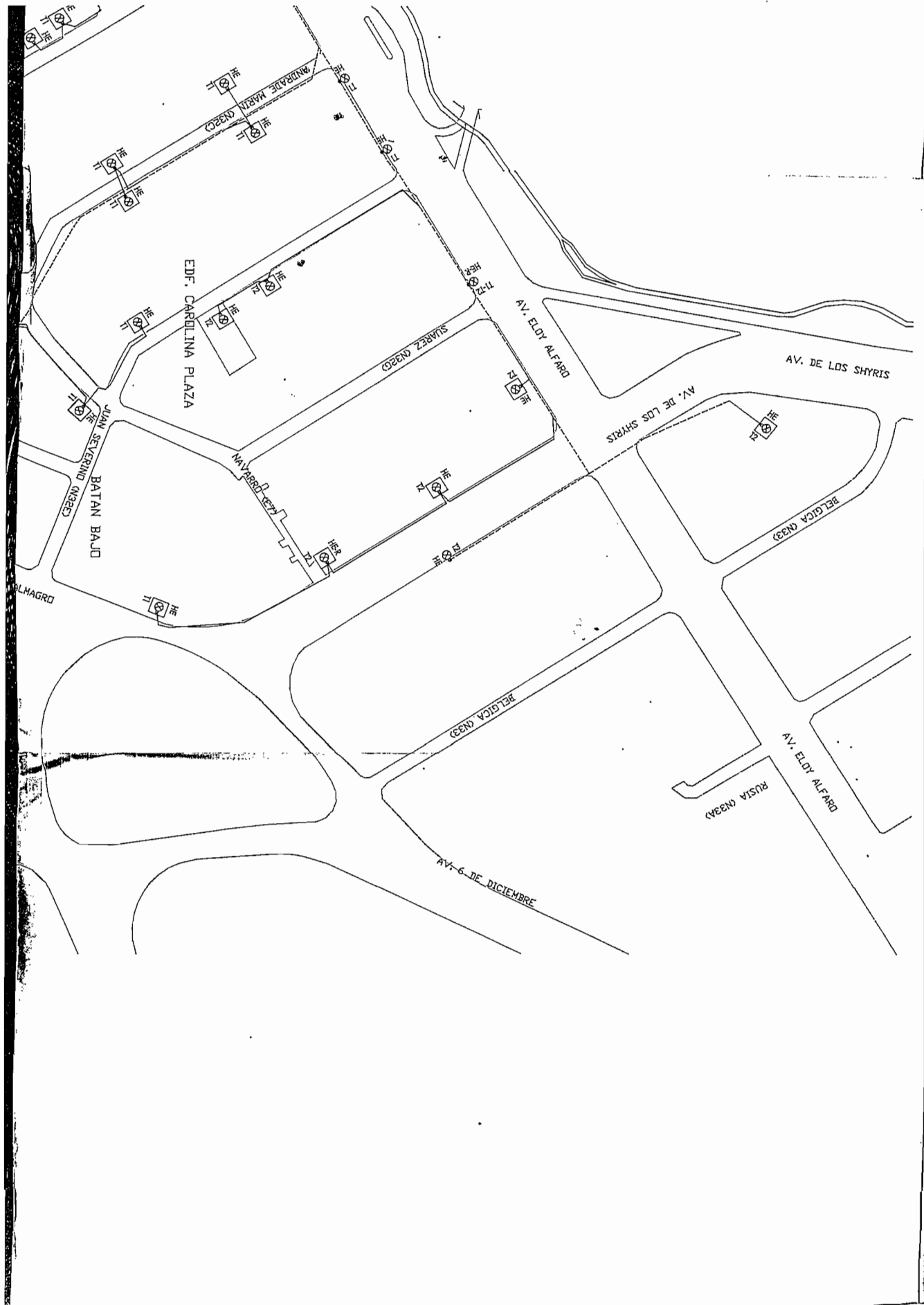
WINNER Q300

ALVARO Q700

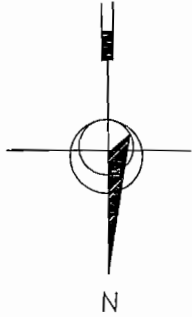
TOBAR Q320



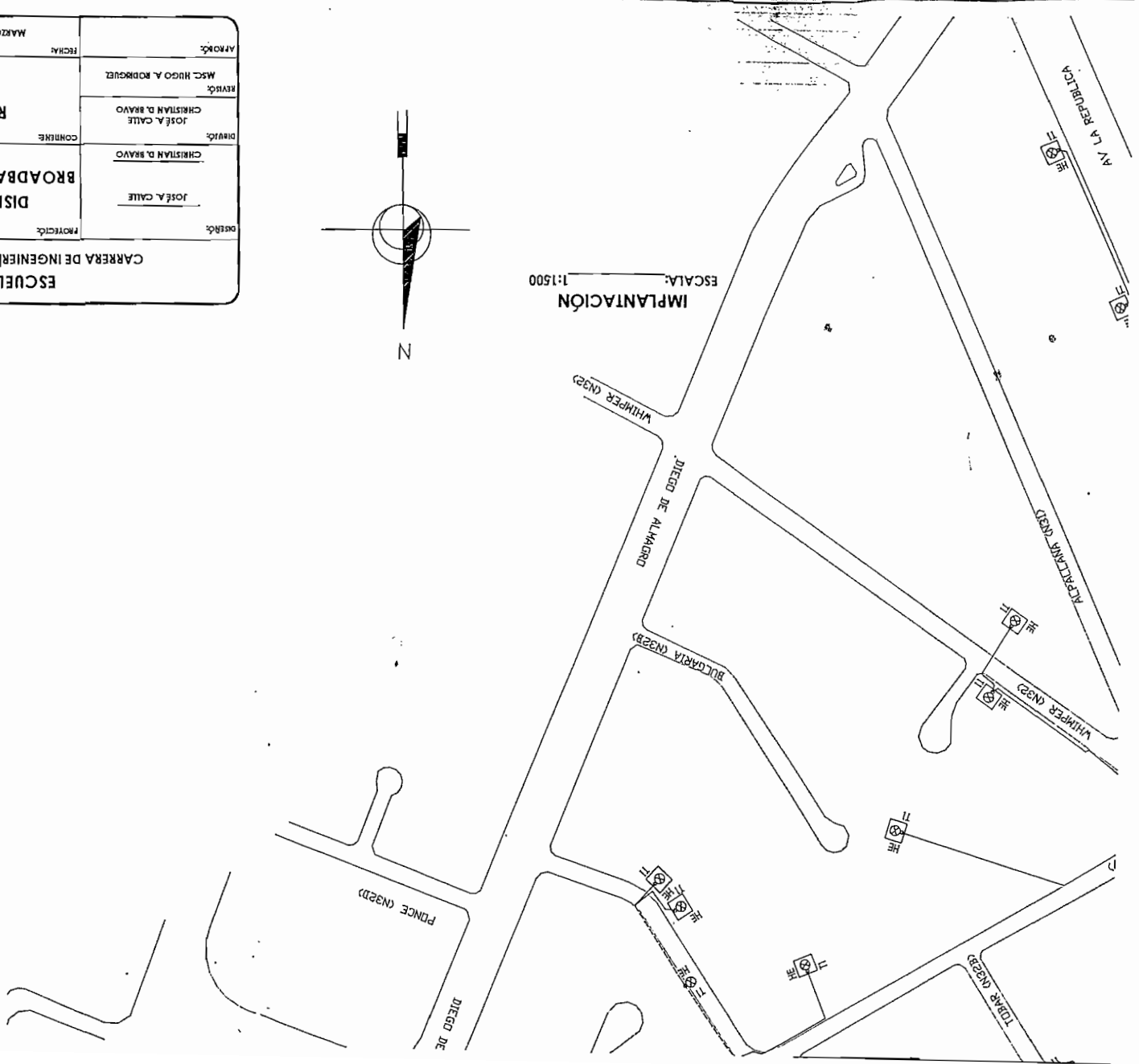
PARQUE CAROLINA



ESCUELA POLITÉCNICA NACIONAL CARRERA DE INGENIERÍA EN ELECTRÓNICA Y REDES DE LA INFORMACIÓN		PROYECTO: <u>JOSÉ A. CALLE</u> CHRISTIAN D. BRAVO
DISEÑO DE UN ISP BASADO EN LA TECNOLOGÍA BROADBAND PLC PARA LA EMPRESA ELÉCTRICA QUITO S.A		DIBUJO: <u>JOSÉ A. CALLE</u> CHRISTIAN D. BRAVO
RED BROADBAND PLC DE MEDIA TENSIÓN PRIMARIO 24A		REVISÓ: <u>MSC. HUGO A. RODRIGUEZ</u> CHRISTIAN D. BRAVO
APROBÓ: _____ FECHA: _____	ESCALA: _____ HOJA: _____	MARZO 2004 1:1500 1 DE 13



ESCALA: 1:1500
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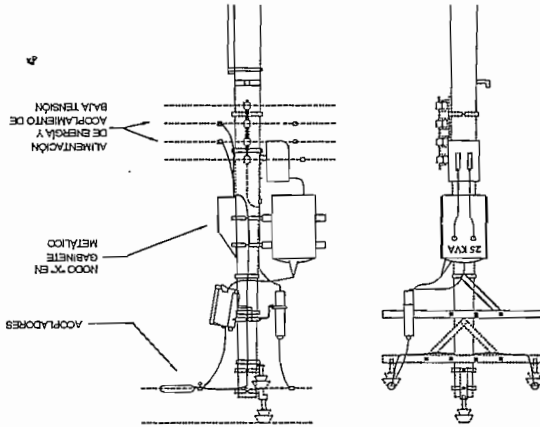


SIMBOLOGÍA

---	RED ASÍEA DE MEDIA TENSIÓN
—	RED SUBESTACIÓN DE MEDIA TENSIÓN
•	EVALUADO EN MEDIA TENSIÓN
HE	NODO X.R.P.C. EN CÁMARA DE TRANSFORMACIÓN, CONSERVACIÓN DE CABLES, TUBO Y RESERVOIRIO
TO	NODO X.R.P.C. EN CÁMARA DE TRANSFORMACIÓN, CONSERVACIÓN DE CABLES, TUBO Y RESERVOIRIO
HE	NODO X.R.P.C. EN POSTE, CONSERVACIÓN DE CABLES (N1) Y RESERVOIRIO (R1)
TO	NODO X.R.P.C. EN POSTE, CONSERVACIÓN DE CABLES (N1) Y RESERVOIRIO (R1)
HE	TRABAJANDO EN MANOS DE BRASO Y TO
TO	TRABAJANDO EN MANOS DE BRASO Y TO
MAESTRÍA	NODO X.R.P.C. EN SUBESTACIÓN, CONSERVACIÓN COMO MAESTRÍA, TRABAJANDO EN MANOS DE BRASO Y TO

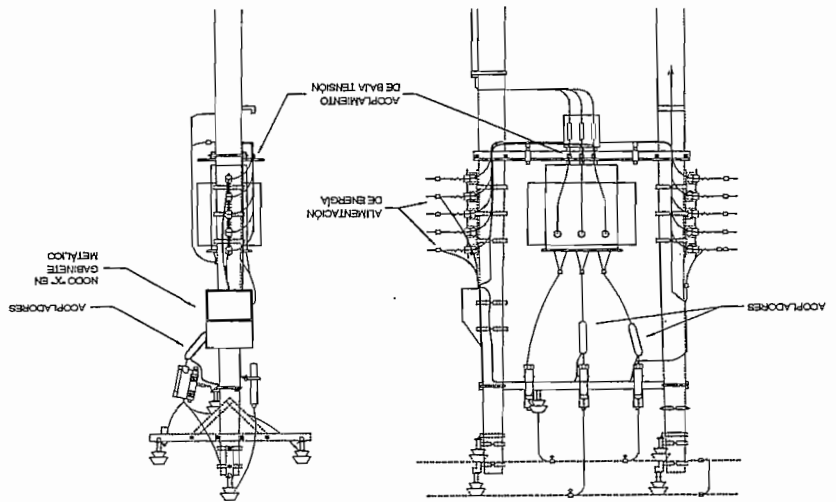
UBICACIÓN DE UN NODO X EN RED MONOFÁSICA

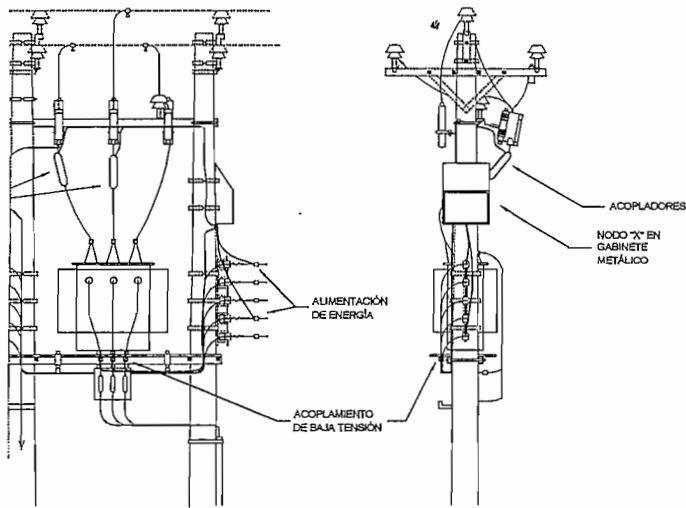
ESCALA 1:50



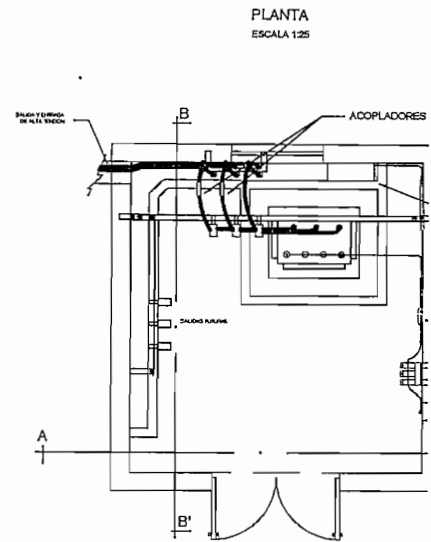
UBICACIÓN DE UN NODO X EN RED TRIFÁSICA

ESCALA 1:50

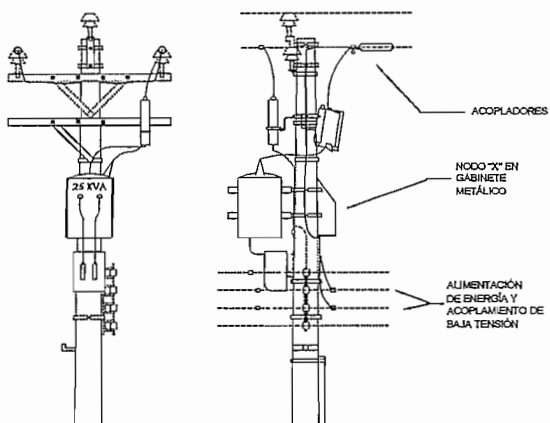




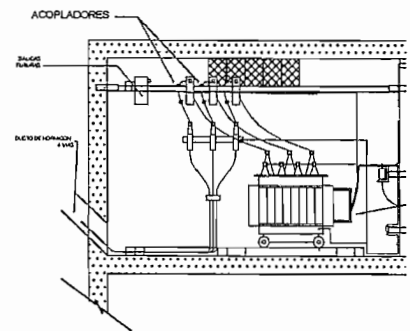
UBICACIÓN DE UN NODO X EN RED TRIFÁSICA
ESCALA 1:20



PLANTA
ESCALA 1:25



UBICACIÓN DE UN NODO X EN RED MONOFÁSICA
ESCALA 1:20



CORTE A - A'
ESCALA 1:25

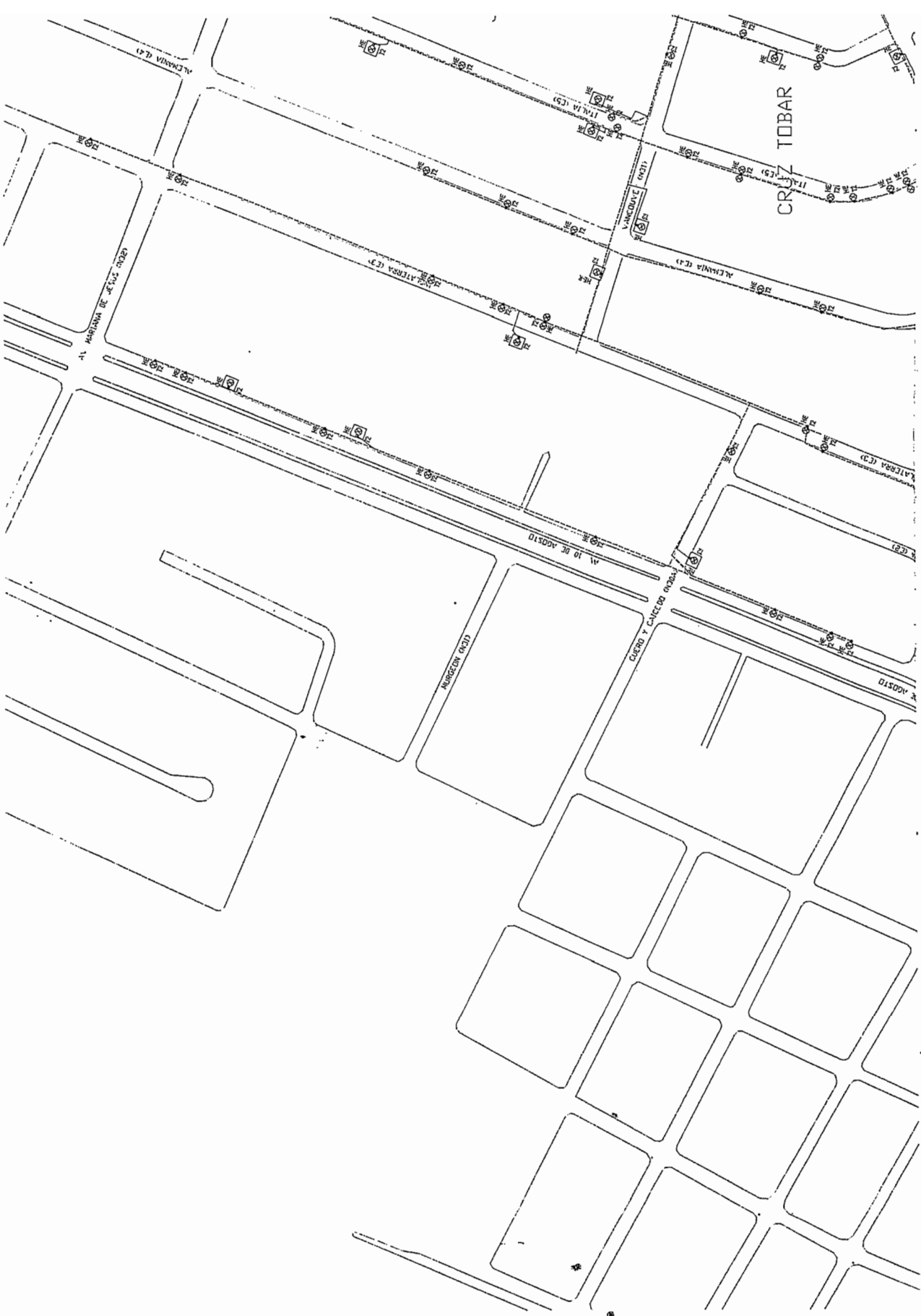


IMPLANTACIÓN
 ESCALA: 1:2000

SIMBOLOGÍA	
	RED ÁEREA DE MEDIA TENSIÓN
	RED SUBTERRÁNEA DE MEDIA TENSIÓN
	ENPAJME AÉREO EN MEDIA TENSIÓN
	NODO "X" BPLIC EN CÁMARA DE TRANSFORMACIÓN, CONFIGURACIÓN DE CABECERA (HE) Y REPELIDOR (RI), TRABAJANDO EN RANURAS DE TIEMPO To Y Td
	NODO "X" BPLIC EN POSTE, CONFIGURACIÓN DE CABECERA (HE) Y REPELIDOR (RI), TRABAJANDO EN RANURAS DE TIEMPO To Y Td
	NODO "S" BPLIC EN SUBESTACIÓN, CONFIGURACIÓN COMO MAESTRA, TRABAJANDO EN RANURA DE TIEMPO To

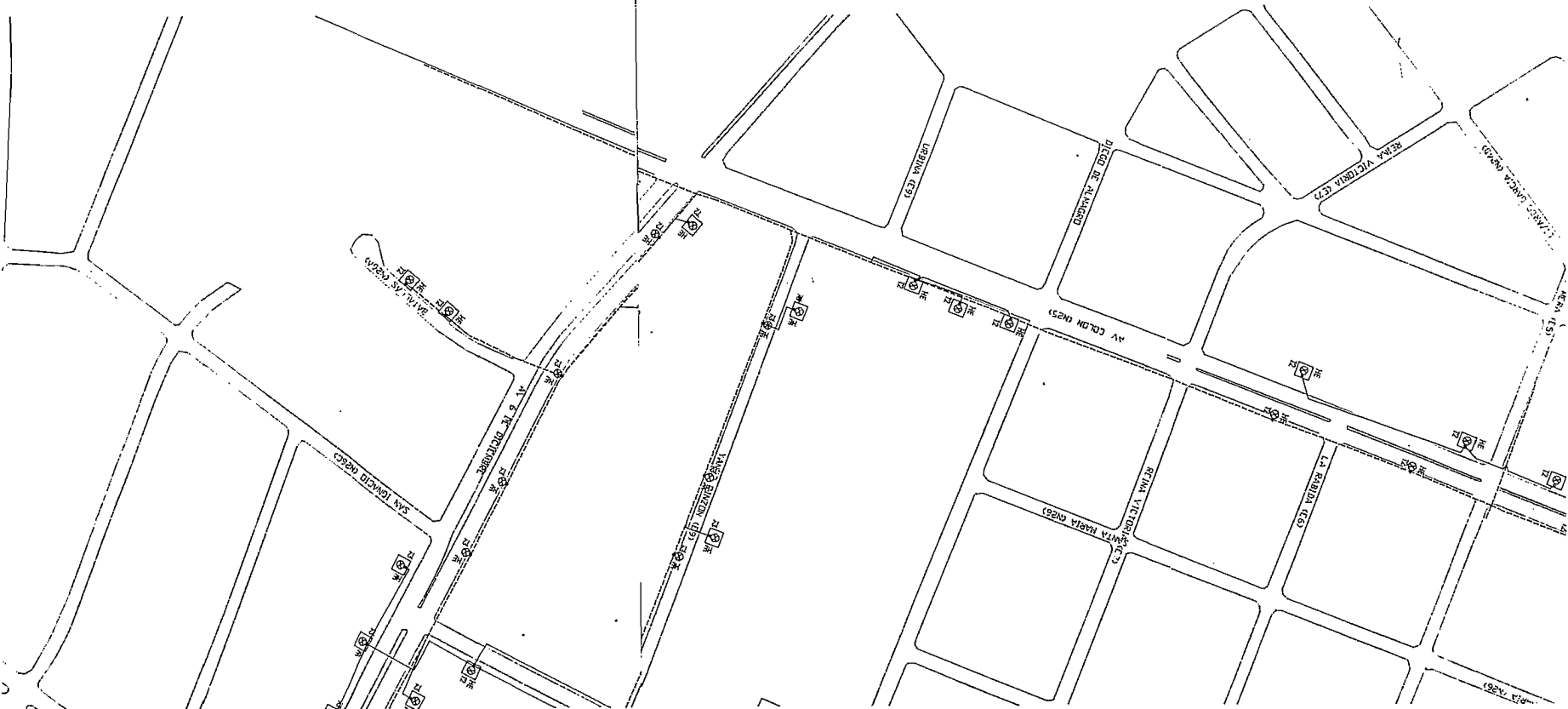
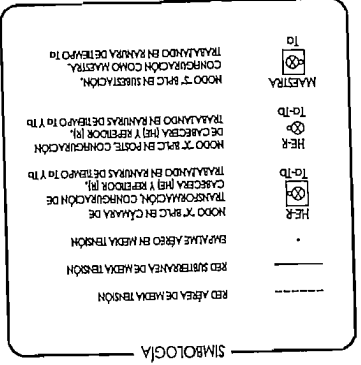
ESCUELA POLITÉCNICA NACIONAL
 CARRERA DE INGENIERÍA EN ELECTRÓNICA Y REDES DE LA INFORMACIÓN

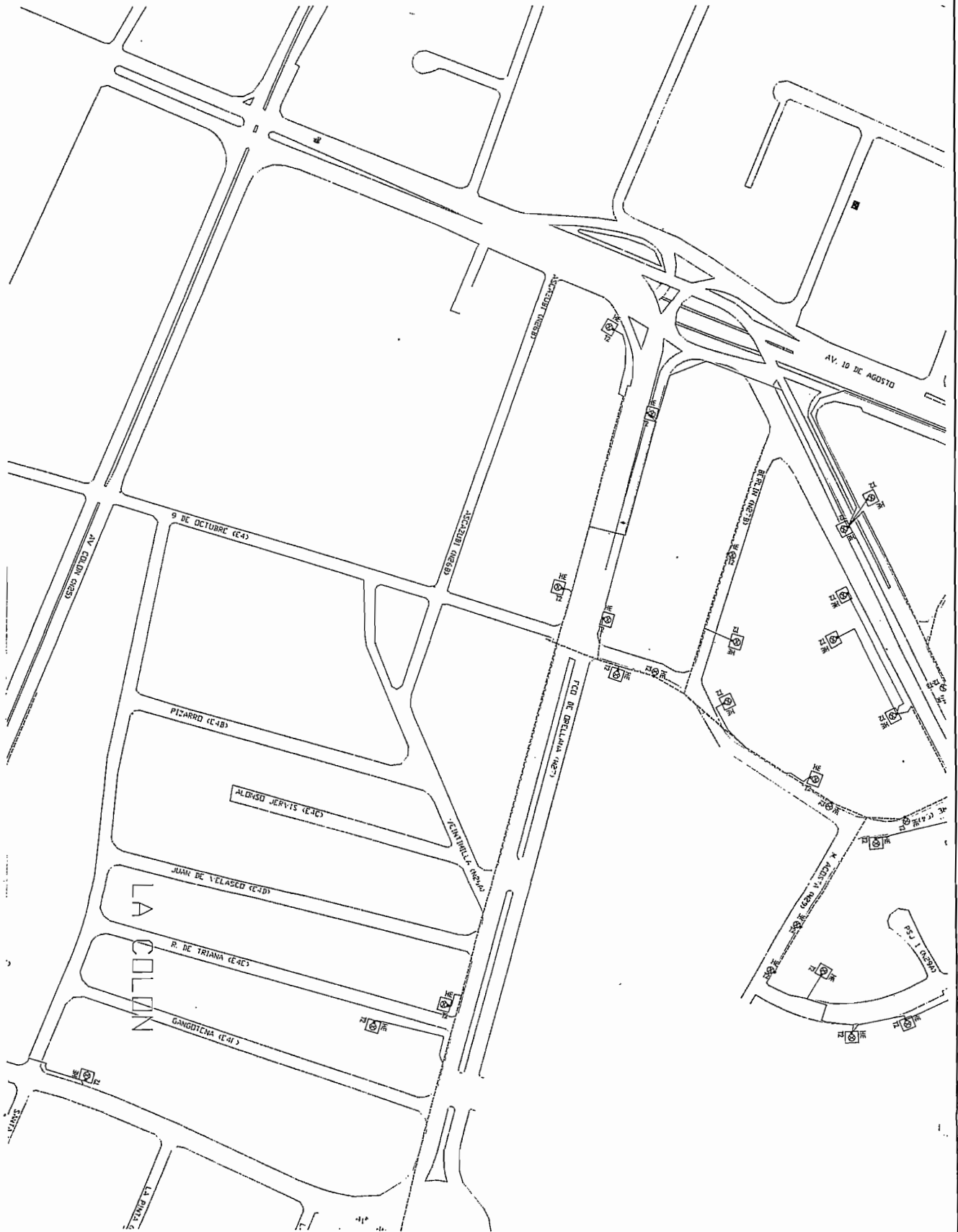
PROY.: JOSÉ A. CALLE CHRISTIAN D. BRAVO	PROYECTO: DISEÑO DE UN ISP BASADO EN LA TECNOLOGÍA BROADBAND PLC PARA LA EMPRESA ELÉCTRICA QUITO S.A.
AUT.: JOSÉ A. CALLE CHRISTIAN D. BRAVO	CONTENIDO: RED BROADBAND PLC DE MEDIA TENSIÓN PRIMARIO 24B (1/2)
DISEÑ.: MSC. ALEX RODRIGUEZ	FECHA: JULIO 2004
ESCALA: 1:2000	HOJA: 2 DE 13

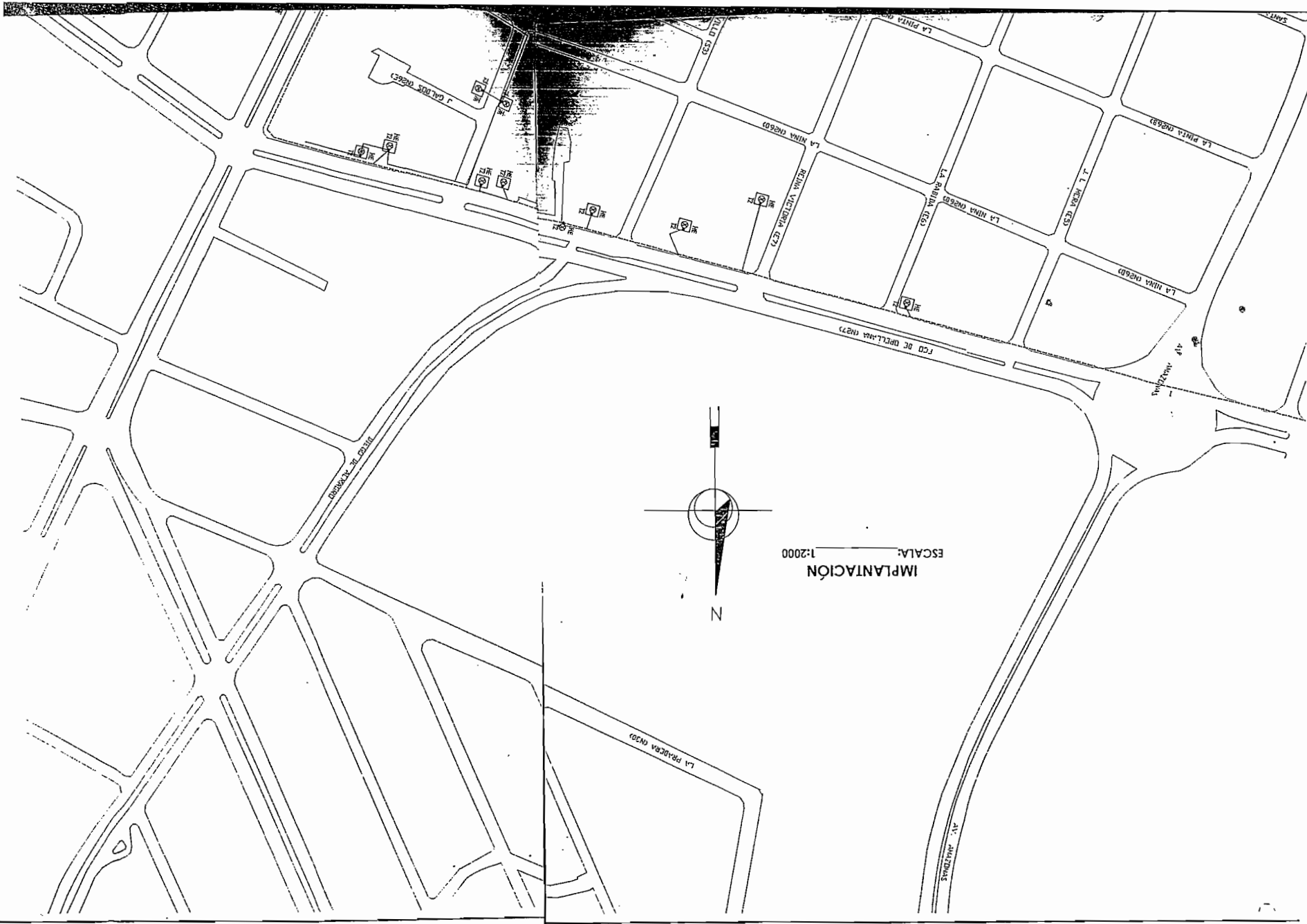


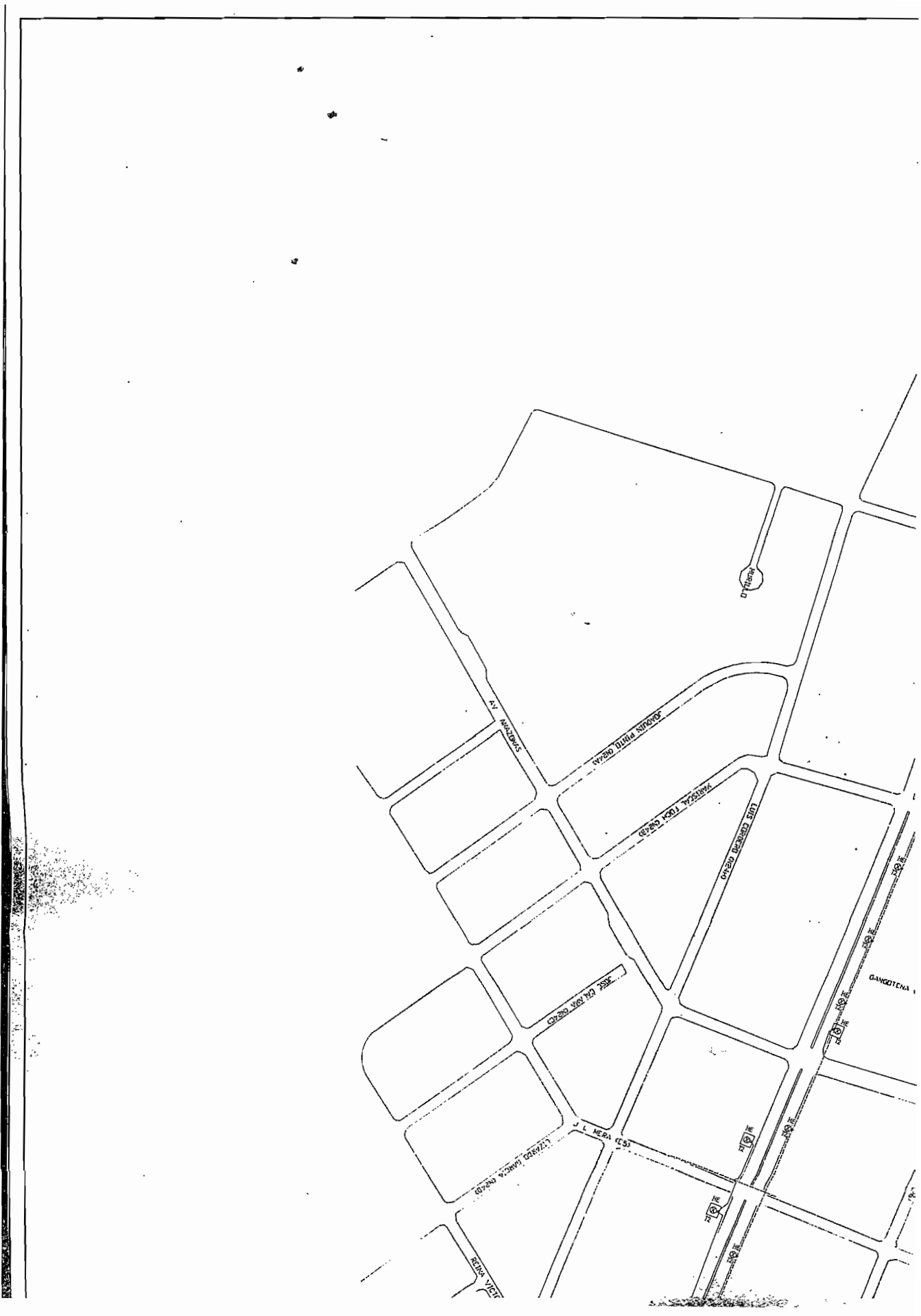


ESCUELA POLITÉCNICA NACIONAL CARRERA DE INGENIERÍA EN ELECTRÓNICA Y REDES DE LA INFORMACIÓN			
PROYECTA:	PROYECTA:	CONTIENE:	CONTIENE:
JOSÉ A. CAJTE	CHRISTIAN D. BRAVO	JOSÉ A. CAJTE	CHRISTIAN D. BRAVO
DIR:	DIR:	JUD:	JUD:
		JOSÉ A. CAJTE	CHRISTIAN D. BRAVO
		CONTIENE:	CONTIENE:
		RED BROADBAND PLC PARA LA EMPRESA ELÉCTRICA QUITO S.A.	RED BROADBAND PLC DE MEDIA TENSIÓN PRIMARIO 248 (2/2)
			MSC. ALEX RODRIGUEZ
			FECHA:
			JULIO 2006
			ESCALA:
			1:2000
			HORA:
			3 DE 13

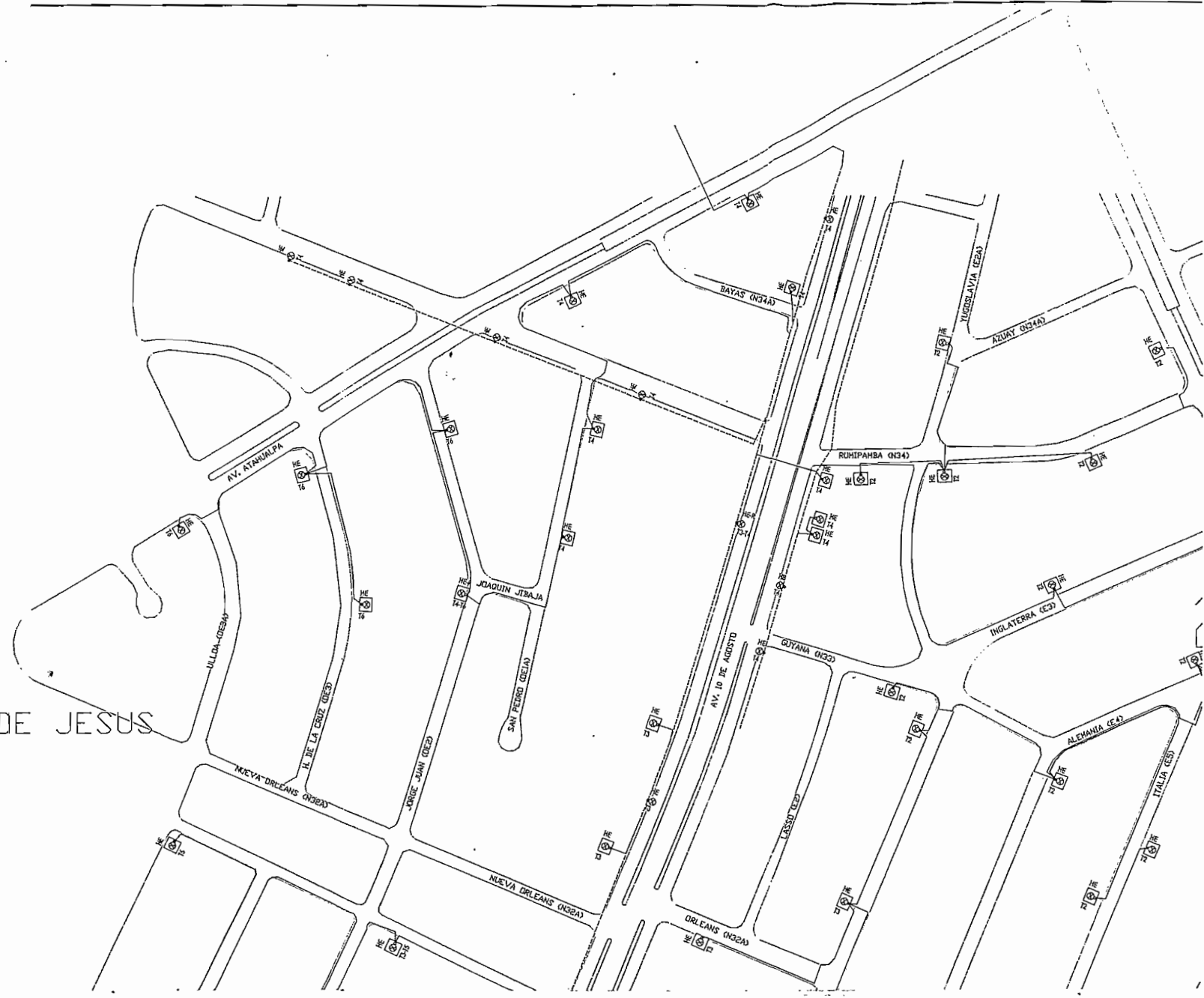




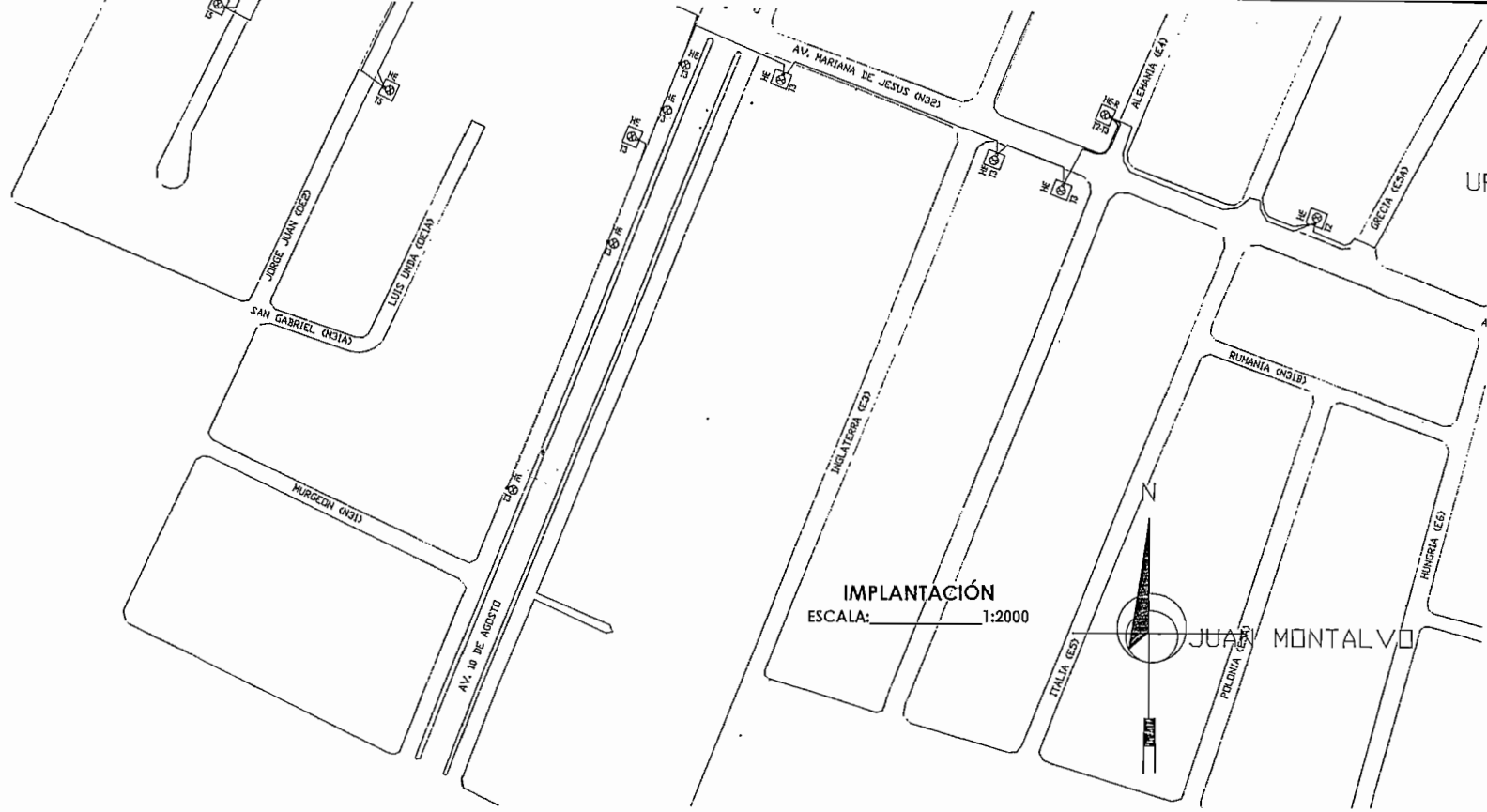




MARIANA DE JESUS





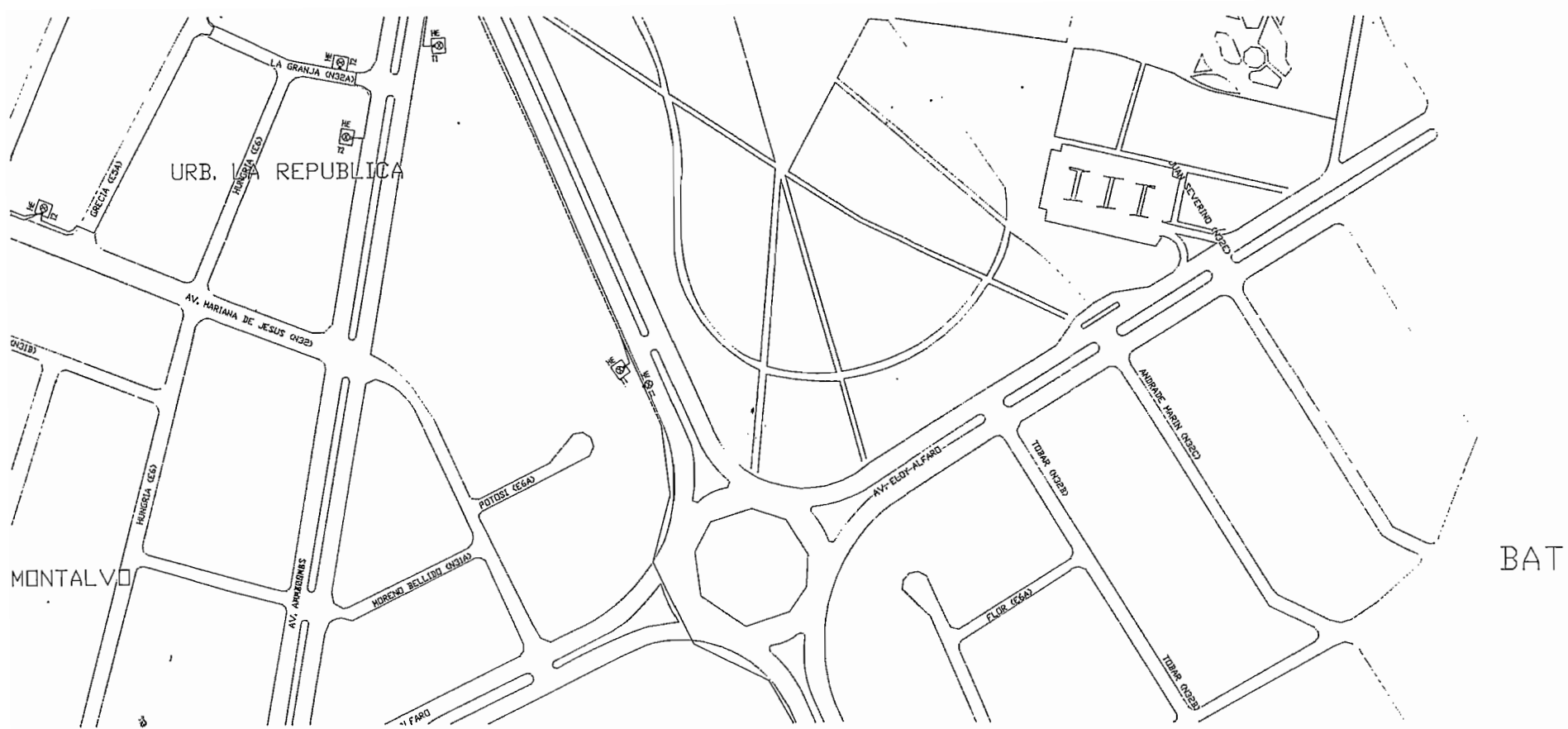


IMPLANTACIÓN
ESCALA: 1:2000



JUAN MONTALVO

UF

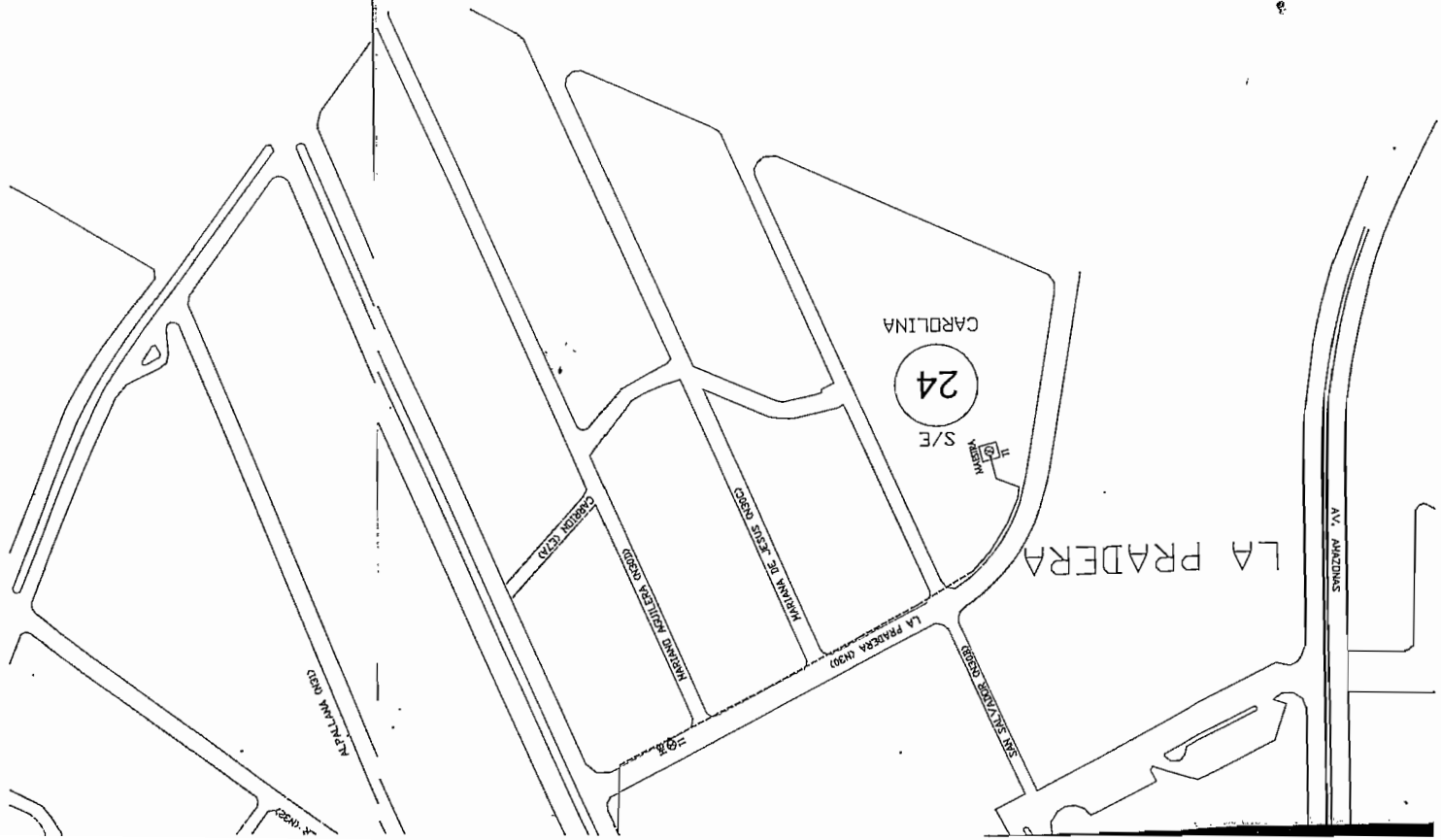


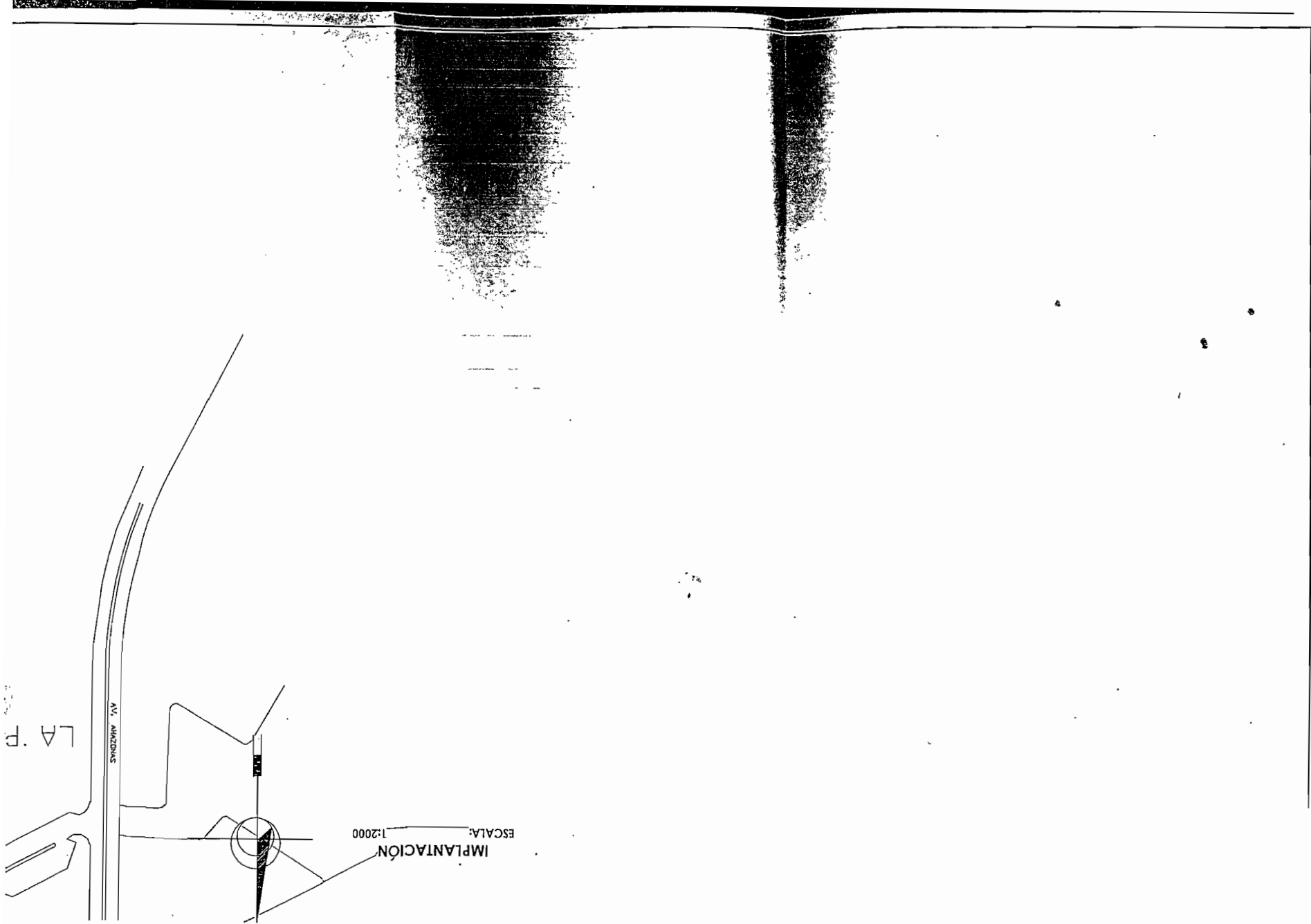
SIMBOLOGÍA

	RED ÁEREA DE MEDIA TENSIÓN
	RED SUBTERRANEA DE MEDIA TENSIÓN
	EMPALME ÁEREO EN MEDIA TENSIÓN
	NODO "X" BPLC EN CÁMARA DE TRANSFORMACIÓN, CONFIGURACIÓN DE CABLERA (HE) Y REPELIDOR (R), TRABAJANDO EN RANURAS DE TIEMPO To Y Tb
	NODO "X" BPLC EN POSTE, CONFIGURACIÓN DE CABLERA (HE) Y REPELIDOR (R), TRABAJANDO EN RANURAS DE TIEMPO To Y Tb
	MAESTRA NODO "S" BPLC EN SUBESTACIÓN, CONFIGURACIÓN COMO MAESTRA, TRABAJANDO EN RANURAS DE TIEMPO To

ESCUELA POLITECNICA NACIONAL CARRERA DE INGENIERÍA EN ELECTRÓNICA Y REDES DE LA INFORMACIÓN			
DISERÓ:	PROYECTÓ:		
JOSÉ A. CALLE	DISEÑO DE UN ISP BASADO EN LA TECNOLOGÍA BROADBAND PLC PARA LA EMPRESA ELÉCTRICA QUITO S.A.		
CHRISTIAN D. BRAVO	CONTIENE:		
DIJÓ:	RED BROADBAND PLC DE MEDIA TENSIÓN PRIMARIO 24C (1/2)		
JOSÉ A. CALLE CHRISTIAN D. BRAVO	REVISÓ:	FECHA:	HOJA:
MSC. HUGO A. RODRIGUEZ	JULIO 2006	ESCALA:	4 DE 13
APROBÓ:	JULIO 2006	ESCALA:	1:2000

ESCUOLA POLITÉCNICA NACIONAL CARRERA DE INGENIERÍA EN ELECTRÓNICA Y REDES DE LA INFORMACIÓN		PROYECTO:	PROYECTO:
DISEÑO DE UN ISP BASADO EN LA TECNOLOGÍA BROADBAND PLC PARA LA EMPRESA ELÉCTRICA QUITO S.A.		RESPONSABLE:	RESPONSABLE:
CONTIENE:		PROYECTO:	PROYECTO:
JOSE A. CALLE		PROYECTO:	PROYECTO:
CHRISTIAN D. BRAVO		PROYECTO:	PROYECTO:
JOSE A. CALLE		PROYECTO:	PROYECTO:
CHRISTIAN D. BRAVO		PROYECTO:	PROYECTO:
CONTIENE:		PROYECTO:	PROYECTO:
RED BROADBAND PLC DE MEDIA TENSIÓN		PROYECTO:	PROYECTO:
PRIMARIO 24C (2/2)		PROYECTO:	PROYECTO:
M.Sc. HUGO A. RODRIGUEZ		PROYECTO:	PROYECTO:
FECHA:		PROYECTO:	PROYECTO:
JULIO 2006		PROYECTO:	PROYECTO:
ESCALA:		PROYECTO:	PROYECTO:
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HOJA:		PROYECTO:	PROYECTO:
5 DE 13		PROYECTO:	PROYECTO:





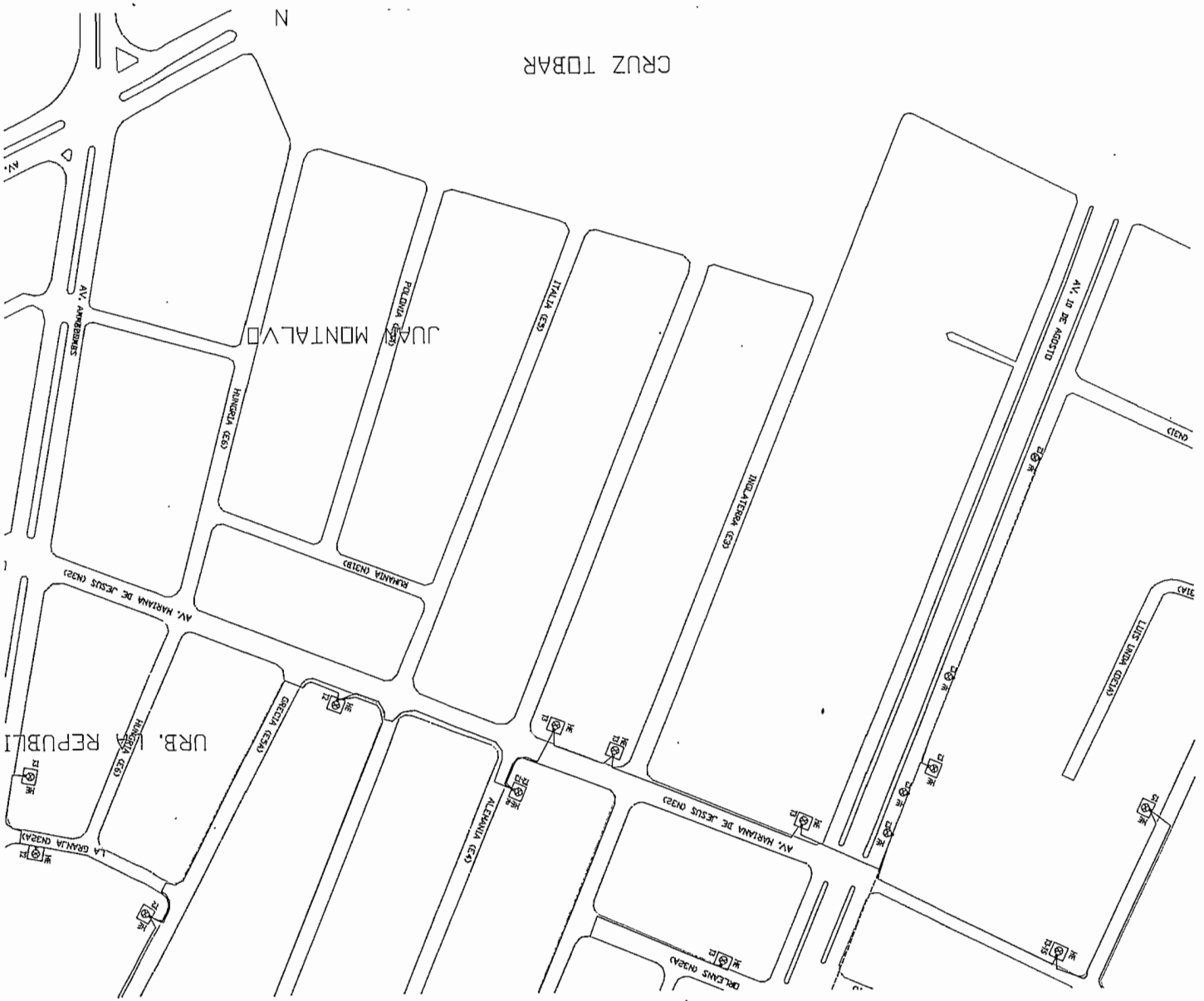
IMPLANTACION
ESCALA: 1:2000

L.A.P.

AV. ANTONIO

CRUZ TOBAR

N



JUAN MONTALVO

URB. REPUBLICA

AV. MARIANA DE JESUS (C82)

AV. DE AGOSTO

LUCAS LAMPA (C83)

AV. MARIANA DE JESUS (C82)

AV. ALBA (C83)

GREGA (C83)

LA GRANJA (C84)

HANGUA (C84)

DORIS (C83)

HANGUA (C83)

HANGUA (C83)

HANGUA (C83)

HANGUA (C83)

HANGUA (C83)

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HANGUA (C84)

HANGUA (C84)

HANGUA (C84)

HANGUA (C84)

HANGUA (C84)

POLINA (C83)

ITALIA (C83)

INDIA (C83)

KIMANTA (C83)

HANGUA (C84)

AV. AMERINDIAS

AV.

24

CAROLINA

LA PRADERA

AV. AMAZONAS

MAESTRA

MARÍA DE JESUS GARCIA

SAN SALVADOR (N300)

LA PRADERA (N300)

HE

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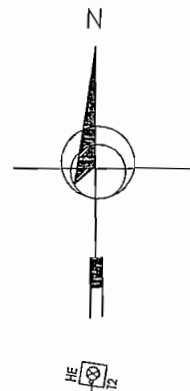
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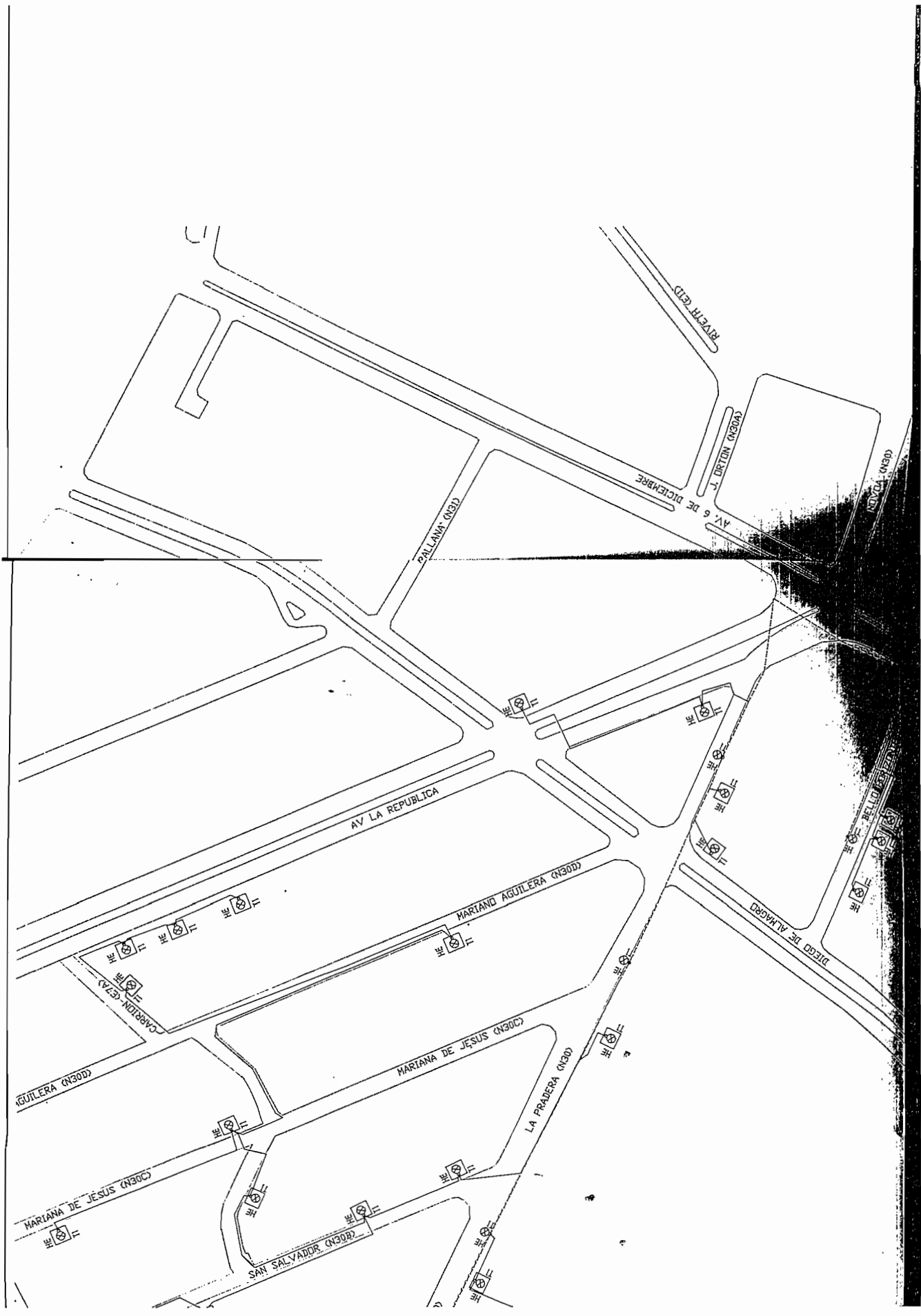
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IMPLANTACIÓN
ESCALA: 1:1500







LA DE SANTA (E4E)

LA NINA (N26D)

GANGOTENA (E4F)

AV. AMAZONAS

LA NINA (N26D)

J. L. MERA (E5)

LA NINA (N26D)

FGU DE ORELLANA (N27)

REINA VICTORIA (E7)

LA NINA (N26D)

LA PINTA (N26B)

LA RABIDA (E6)

SANTA MARTA (N26)

LA PINTA (N26B)

H. CORTES (N26C)

24D

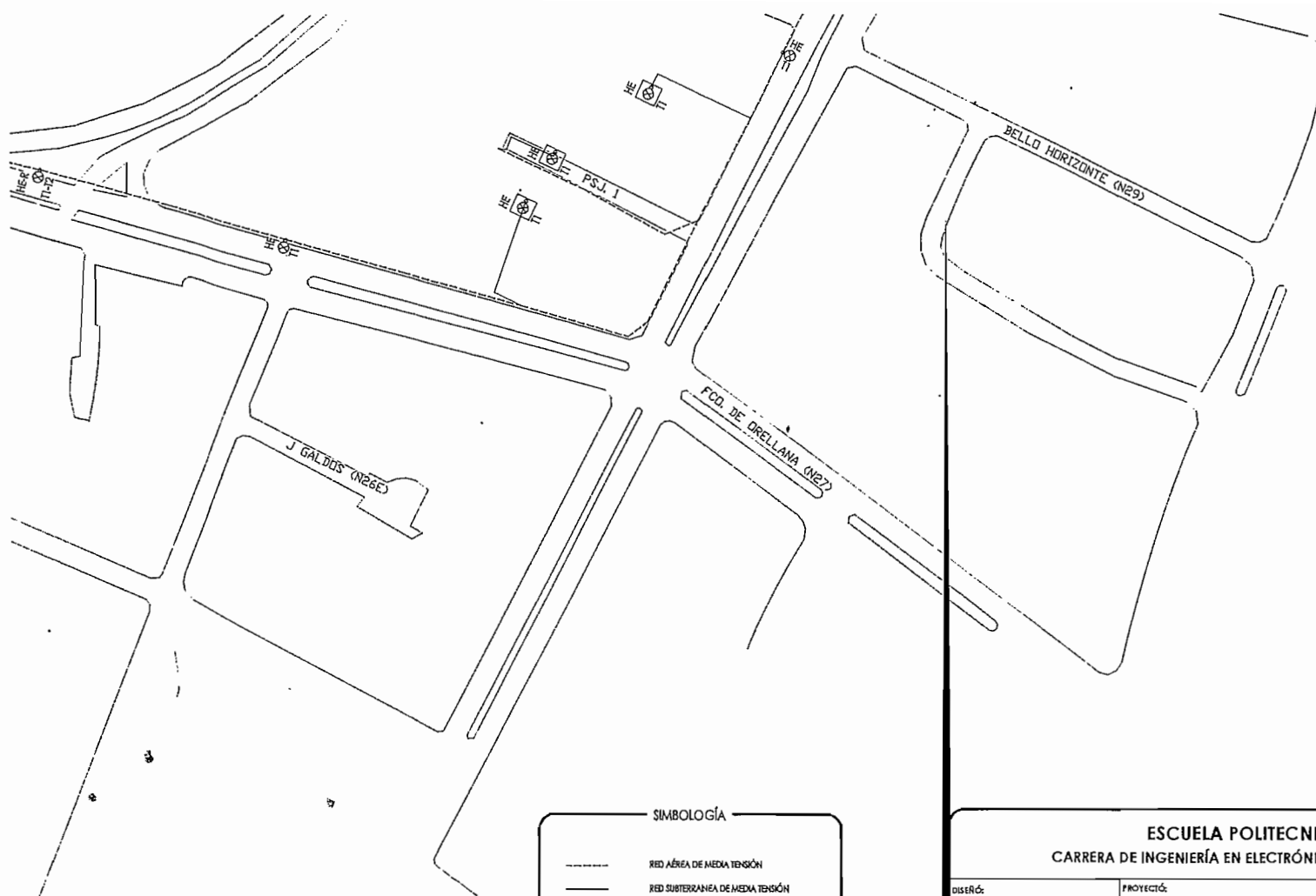
DIEGO DE ALBARRO

LA RABIDA (E6)

REINA VICTORIA (E7)

SANTA MARTA (N26)

AV

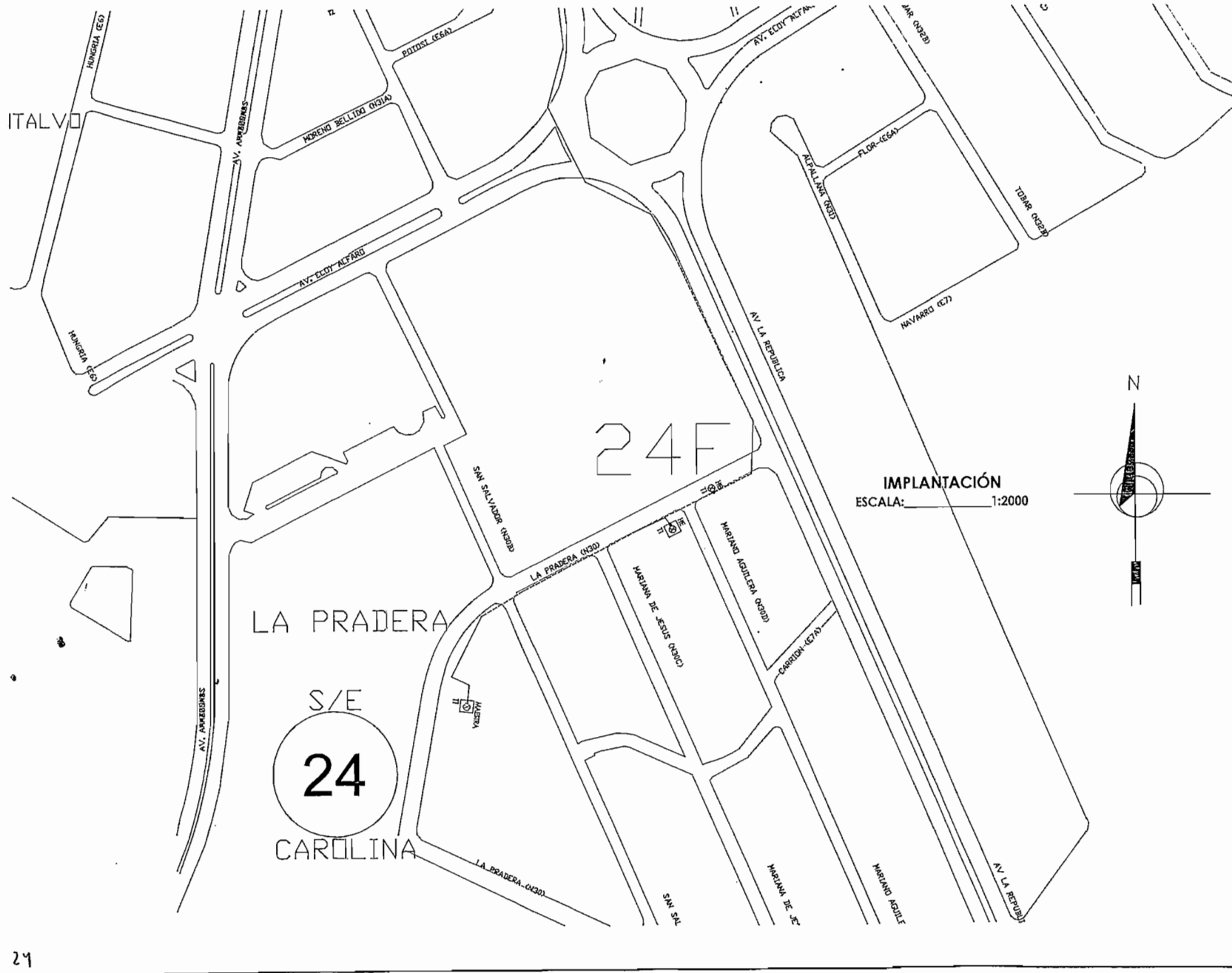


SIMBOLOGÍA

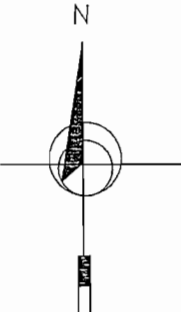
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	RED SUBTERRANEA DE MEDIA TENSIÓN
	EMPALME AÉREO EN MEDIA TENSIÓN
	NODO "R" BPLC EN CÁMARA DE TRANSFORMACIÓN, CONFIGURACIÓN DE CABECERA (HE) Y REPETIDOR (R), TRABAJANDO EN RANURAS DE TIEMPO To Y Tb
	NODO "R" BPLC EN POSTE, CONFIGURACIÓN DE CABECERA (HE) Y REPETIDOR (R), TRABAJANDO EN RANURAS DE TIEMPO To Y Tb
	NODO "S" BPLC EN SUBESTACIÓN, CONFIGURACIÓN COMO MAESTRA, TRABAJANDO EN RANURAS DE TIEMPO To

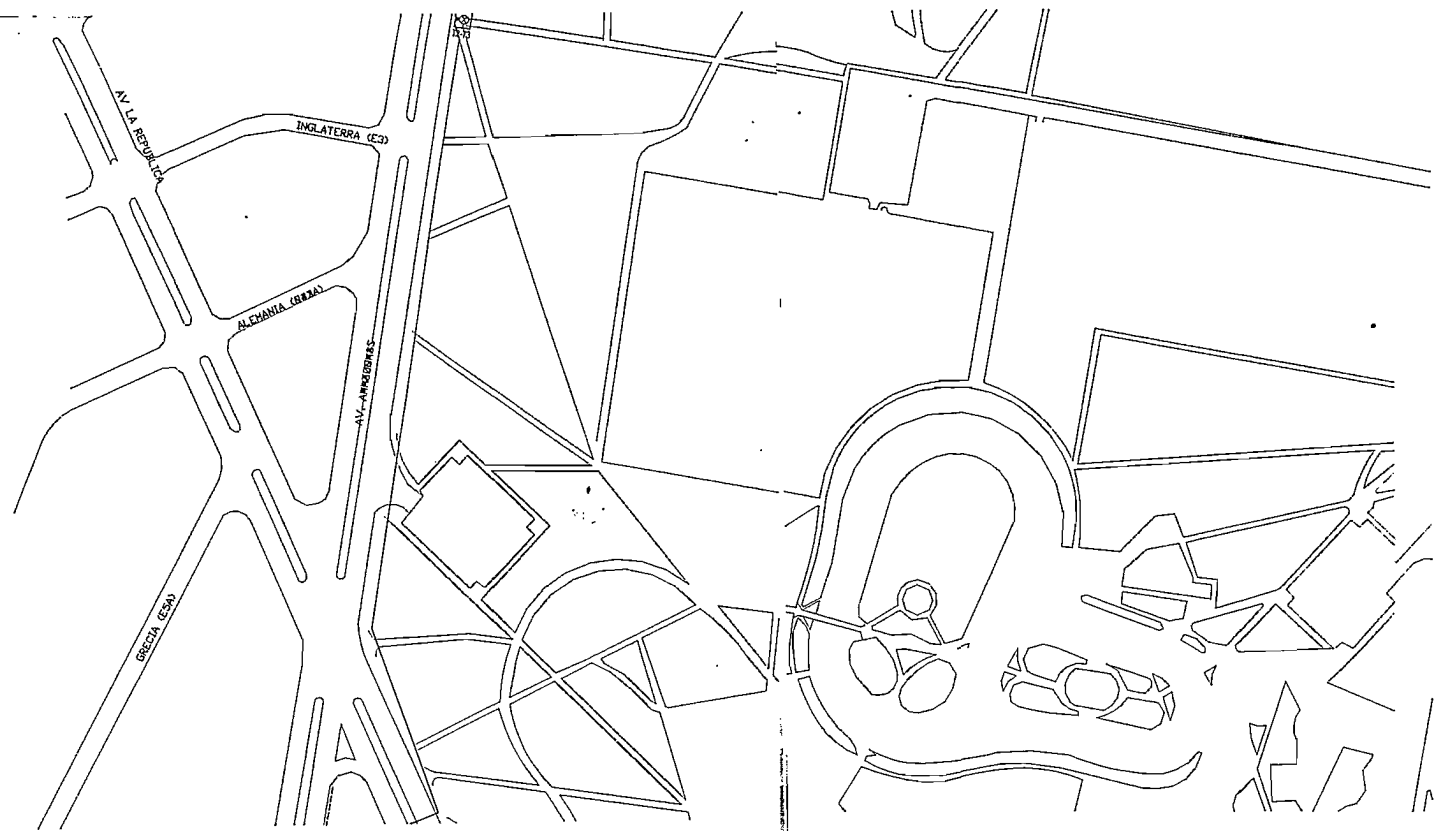
ESCUELA POLITECNICA NACIONAL
CARRERA DE INGENIERÍA EN ELECTRÓNICA Y REDES DE LA INFORMACIÓN

<p>DISEÑO DE UN ISP BASADO EN LA TECNOLOGÍA BROADBAND PLC PARA LA EMPRESA ELÉCTRICA QUITO S.A.</p>	
<p>DISERÓ: JOSÉ A. CALLE CHRISTIAN D. BRAVO</p>	<p>PROYECTÓ:</p>
<p>DIBUJÓ: JOSÉ A. CALLE CHRISTIAN D. BRAVO</p>	<p>CONTIENE: RED BROADBAND PLC DE MEDIA TENSIÓN PRIMARIO 24D</p>
<p>REVISÓ: MSC. HUGO A. RODRIGUEZ</p>	<p>APROBÓ:</p>
<p>FECHA: JULIO 2006</p>	<p>ESCALA: 1:1.500</p>
<p>HOJA: 6 DE 13</p>	



IMPLANTACIÓN
ESCALA: 1:2000

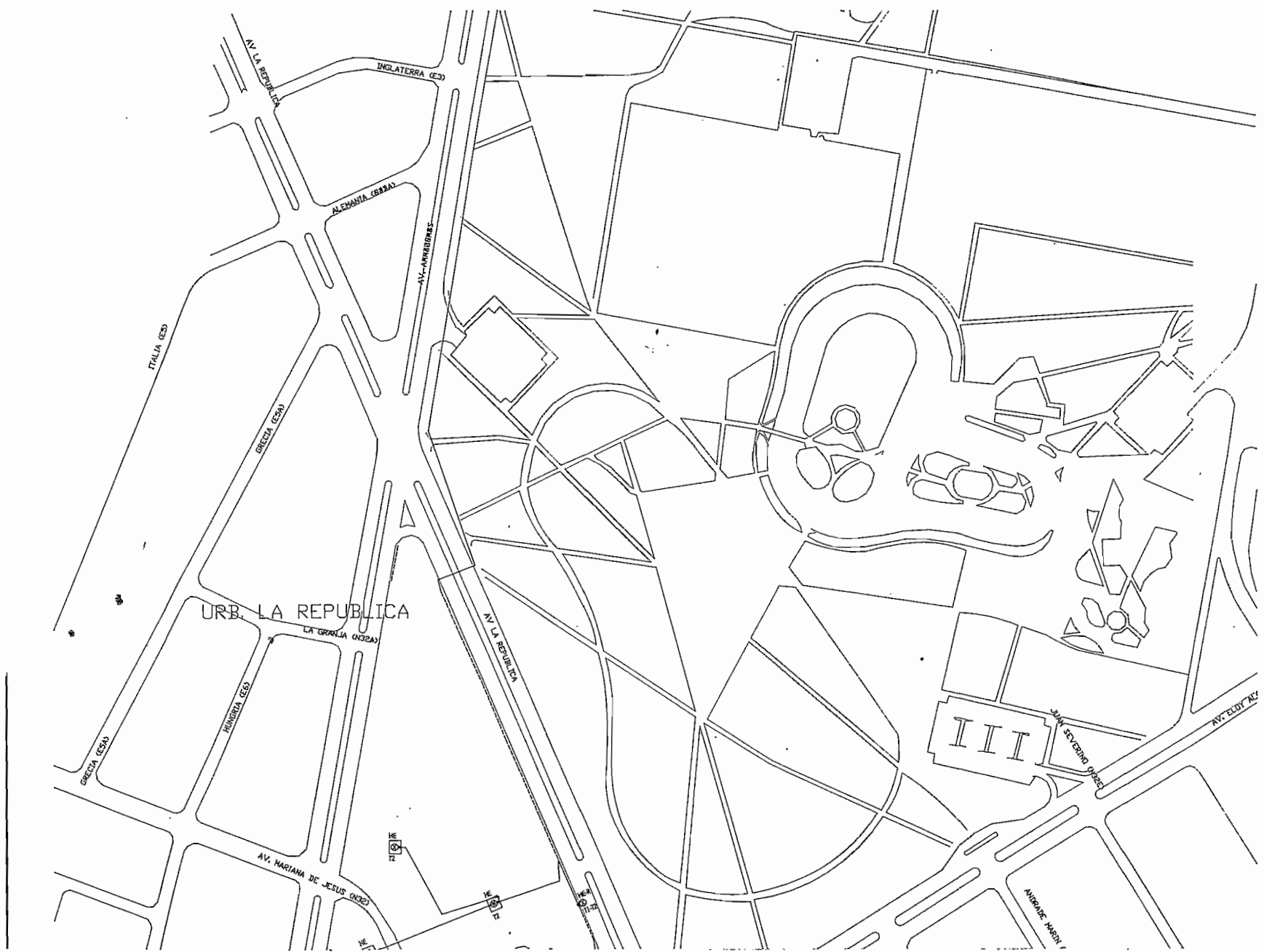


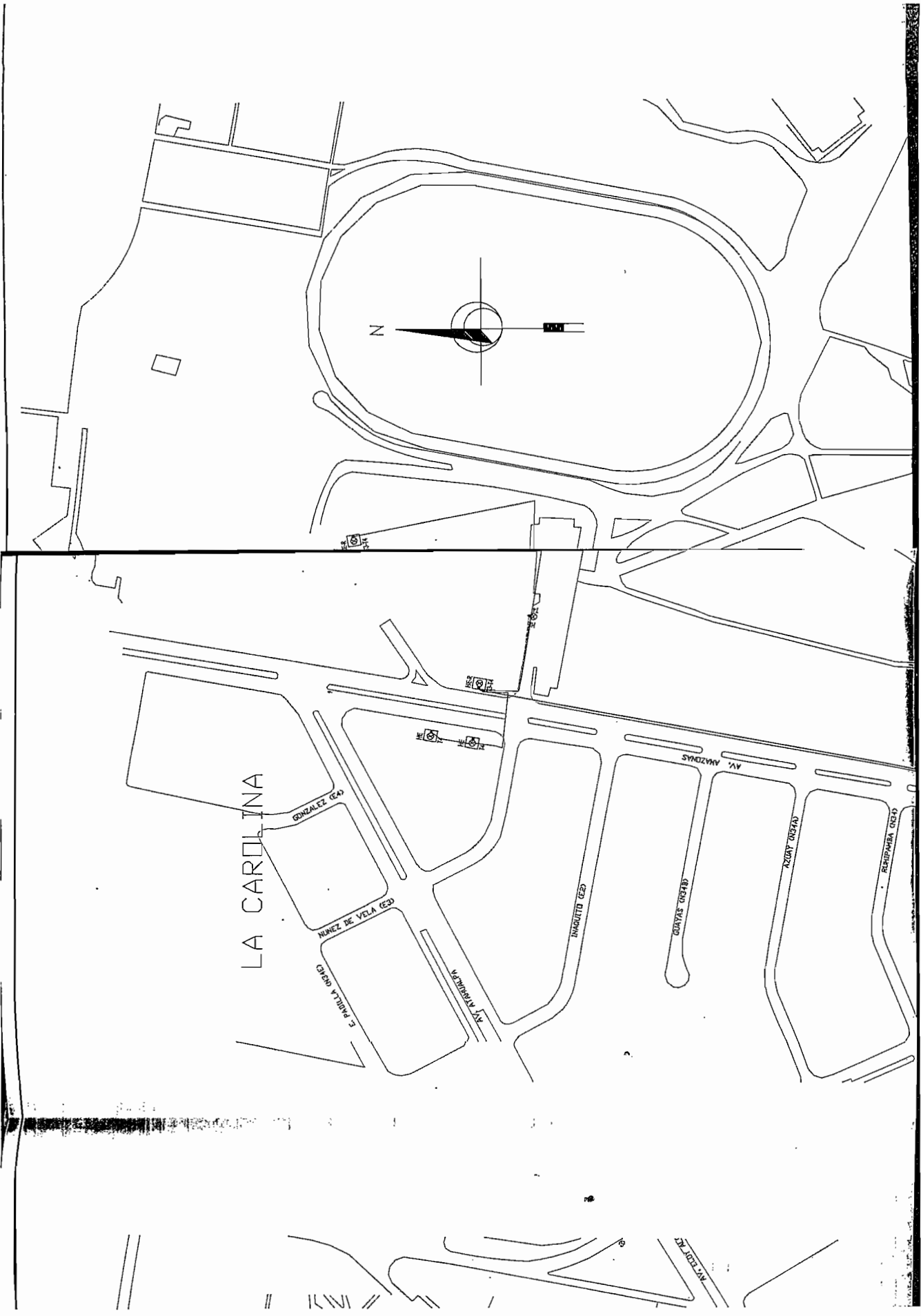


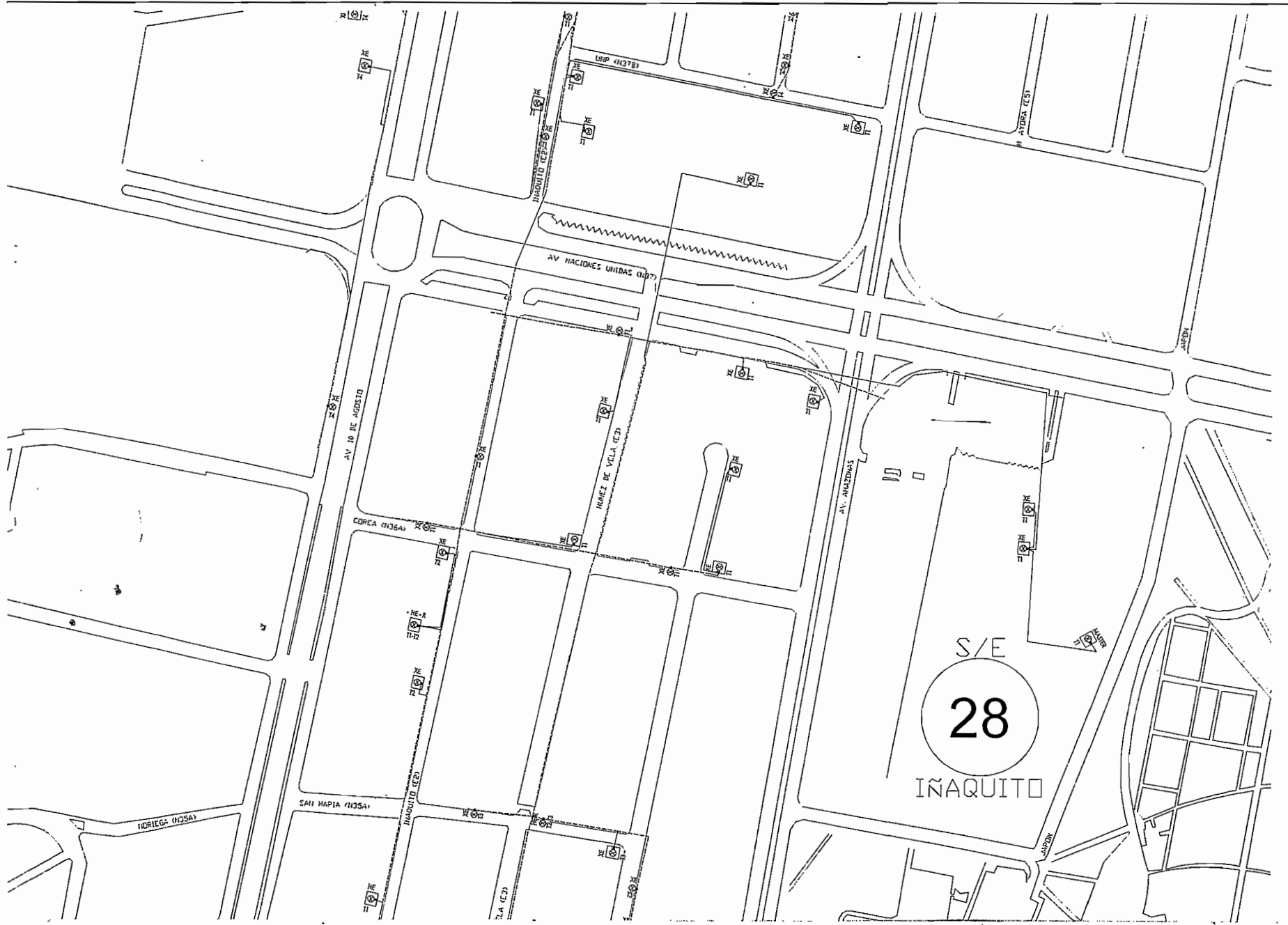
SIMBOLOGÍA

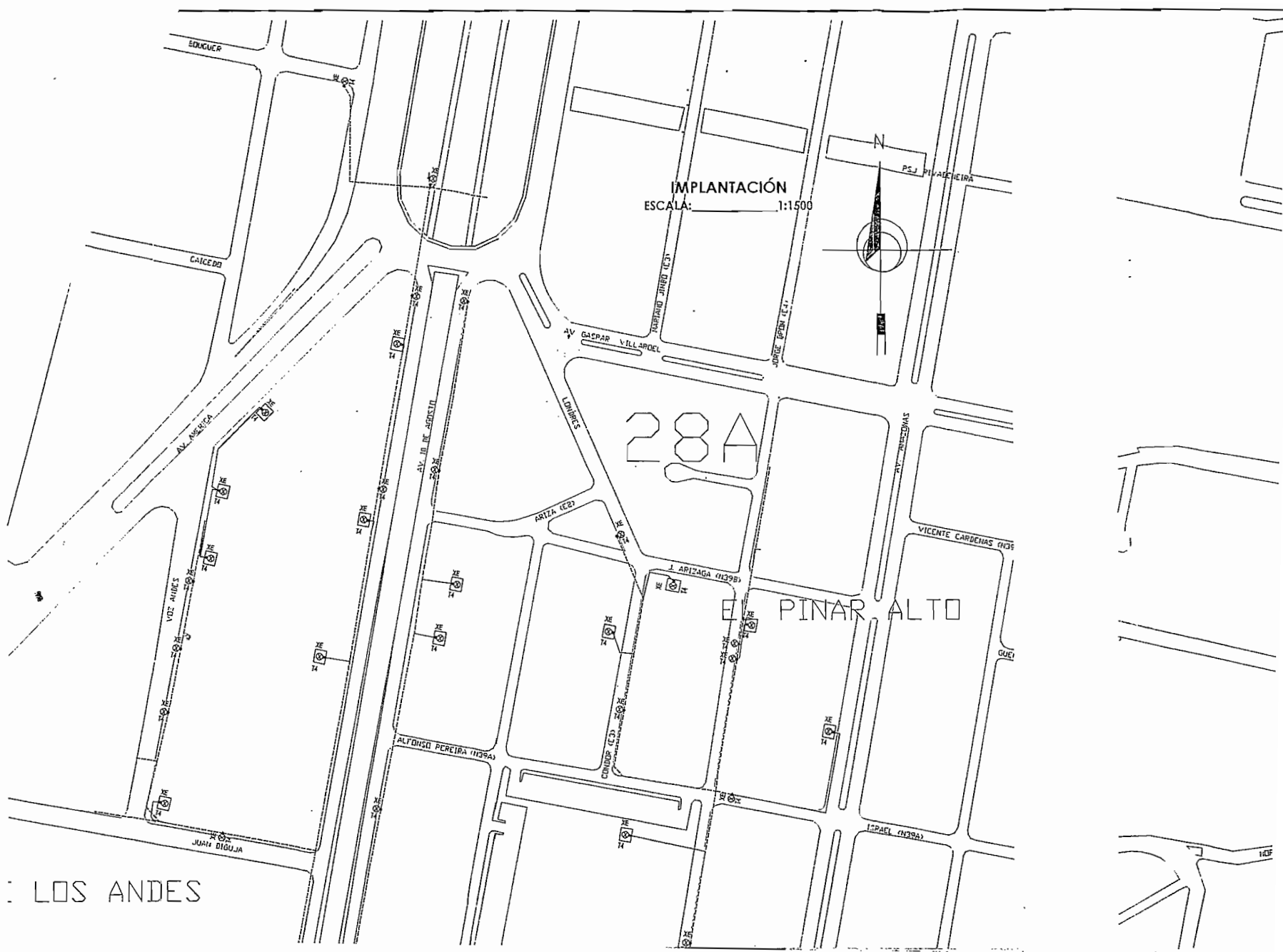
---	RED ÁEREA DE MEDIA TENSIÓN
—	RED SUBTERRÁNEA DE MEDIA TENSIÓN
•	EMPALME AÉREO EN MEDIA TENSIÓN
HER ⊗ Tg-Yb	NODO "X" RPLC EN CÁMARA DE TRANSFORMACIÓN, CONFIGURACIÓN DE CABECERA (HE) Y REPETIDOR (R), TRABAJANDO EN RANURAS DE TIEMPO Tg Y Yb
HER ⊗ Tg-Yb	NODO "X" RPLC EN POSTE, CONFIGURACIÓN DE CABECERA (HE) Y REPETIDOR (R), TRABAJANDO EN RANURAS DE TIEMPO Tg Y Yb
MAESTRA ⊗ Tg	NODO "3" RPLC EN SIMESTACIÓN, CONFIGURACIÓN COMO MAESTRA, TRABAJANDO EN RANURAS DE TIEMPO Tg

ESCUELA POLITECNICA NACIONAL CARRERA DE INGENIERÍA EN ELECTRÓNICA Y REDES DE LA INFORMACIÓN			
PROYECTO:	DISEÑO DE UN ISP BASADO EN LA TECNOLOGÍA BROADBAND PLC PARA LA EMPRESA ELÉCTRICA QUITO S.A.		
PROYECTISTA:	JOSÉ A. CALLE	CONTIENE:	RED BROADBAND PLC DE MEDIA TENSIÓN PRIMARIO 24F
PROYECTISTA:	CHRISTIAN D. BRAVO		
PROYECTISTA:	JOSÉ A. CALLE CHRISTIAN D. BRAVO		
PROYECTISTA:	MSC. HUGO A. RODRIGUEZ	FECHA:	JULIO 2004
PROYECTISTA:		ESCALA:	1:2000
PROYECTISTA:		HOJA:	6 DE 13

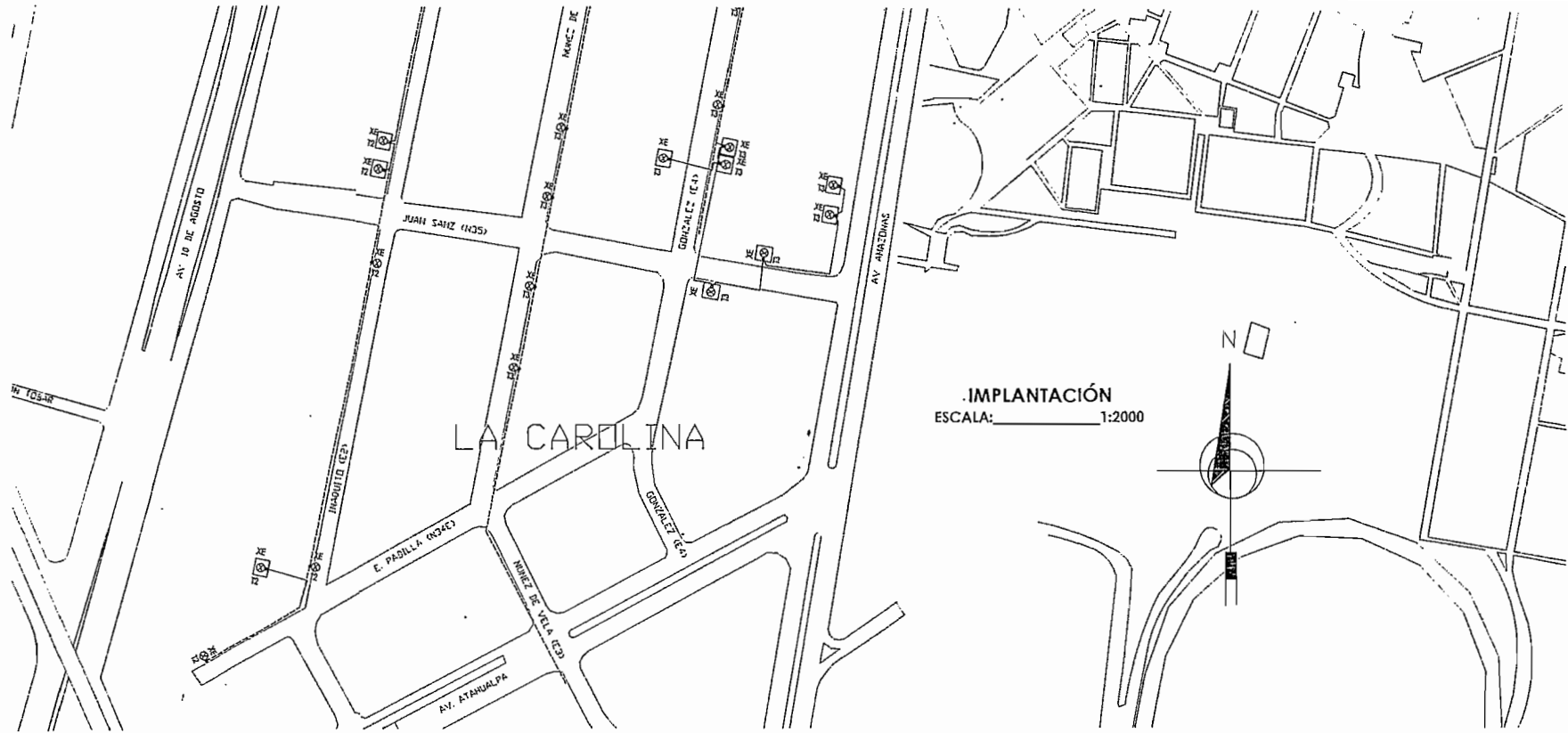








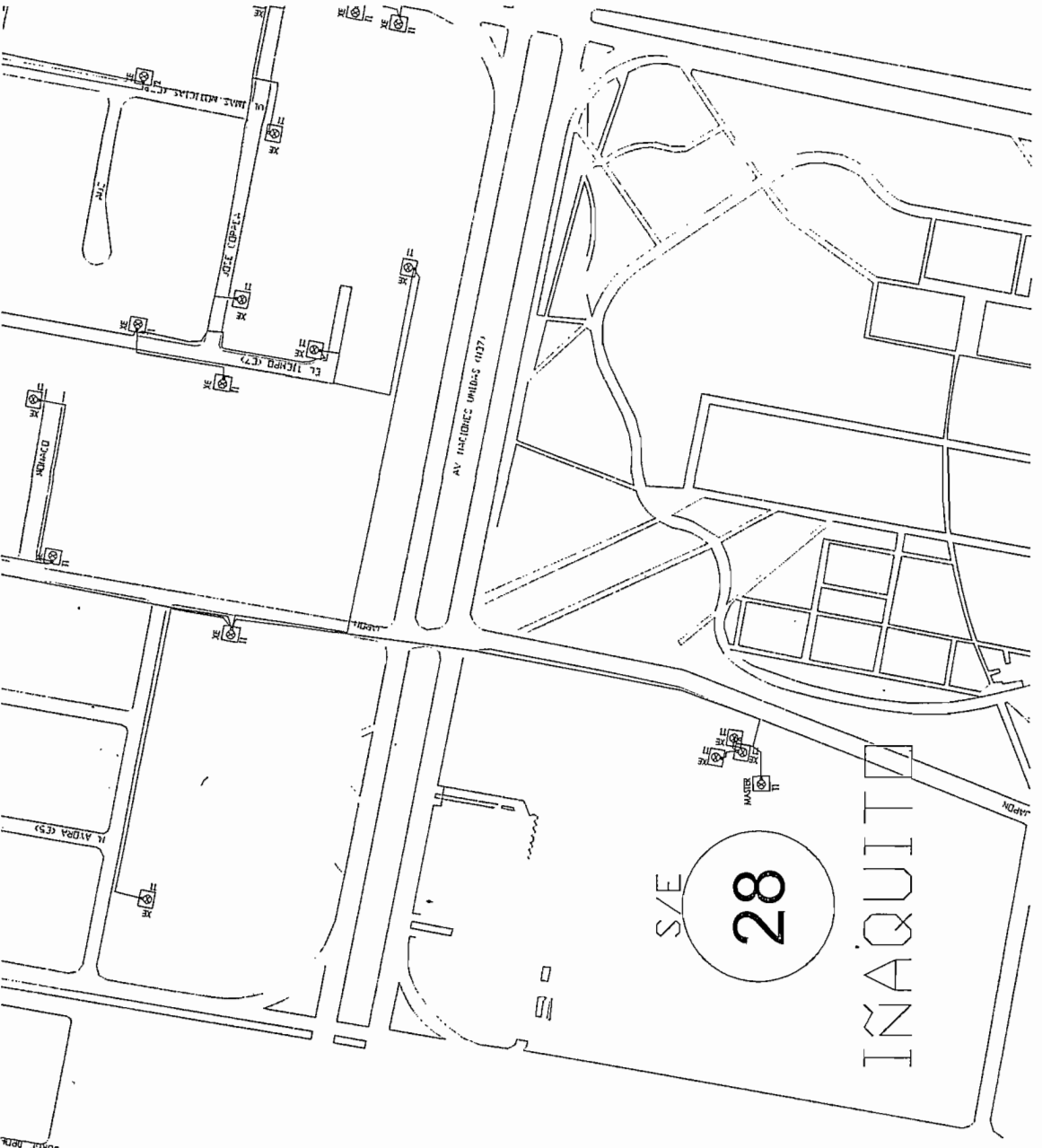
LOS ANDES

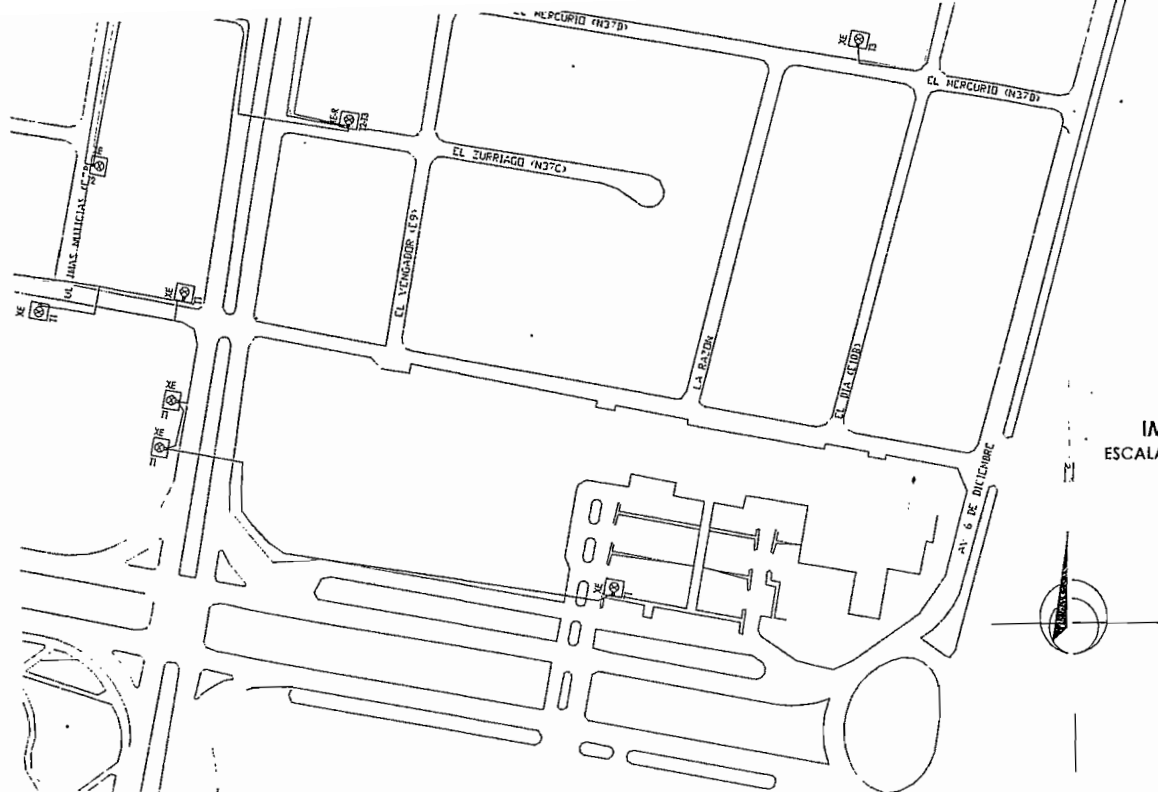


SIMBOLOGÍA

	RED ÁEREA DE MEDIA TENSIÓN
	RED SUBTERRÁNEA DE MEDIA TENSIÓN
	EMPLAQUE AÉREO EN MEDIA TENSIÓN
	NODO 2º SPIC EN CÁMARA DE TRANSFORMACIÓN, CONFIGURACIÓN DE CABECERA (HE) Y REPETIDOR (R), TRABAJANDO EN RAMIFRAS DE TIEMPO Ta Y Tb
	NODO 2º SPIC EN POSTE, CONFIGURACIÓN DE CABECERA (HE) Y REPETIDOR (R), TRABAJANDO EN RAMIFRAS DE TIEMPO Ta Y Tb
	NODO 3º SPIC EN SUBESTACIÓN, CONFIGURACIÓN COMO MAESTRA, TRABAJANDO EN RAMIFRAS DE TIEMPO Ta

ESCUELA POLITECNICA NACIONAL CARRERA DE INGENIERÍA EN ELECTRÓNICA Y REDES DE LA INFORMACIÓN			
DISEÑÓ:	PROYECTÓ:	DISEÑO DE UN ISP BASADO EN LA TECNOLOGÍA BROADBAND PLC PARA LA EMPRESA ELÉCTRICA QUITO S.A	
JOSÉ A. CALLE	CHRISTIAN D. BRAVO	RED BROADBAND PLC DE MEDIA TENSIÓN PRIMARIO 28A	
DIBUJÓ:			
JOSÉ A. CALLE CHRISTIAN D. BRAVO			
REVISÓ:	MSC. ALEX RODRIGUEZ		
APROBÓ:	FECHA:	ESCALA:	HOJA:
	JULIO 2006	1:2000	9 DE 13





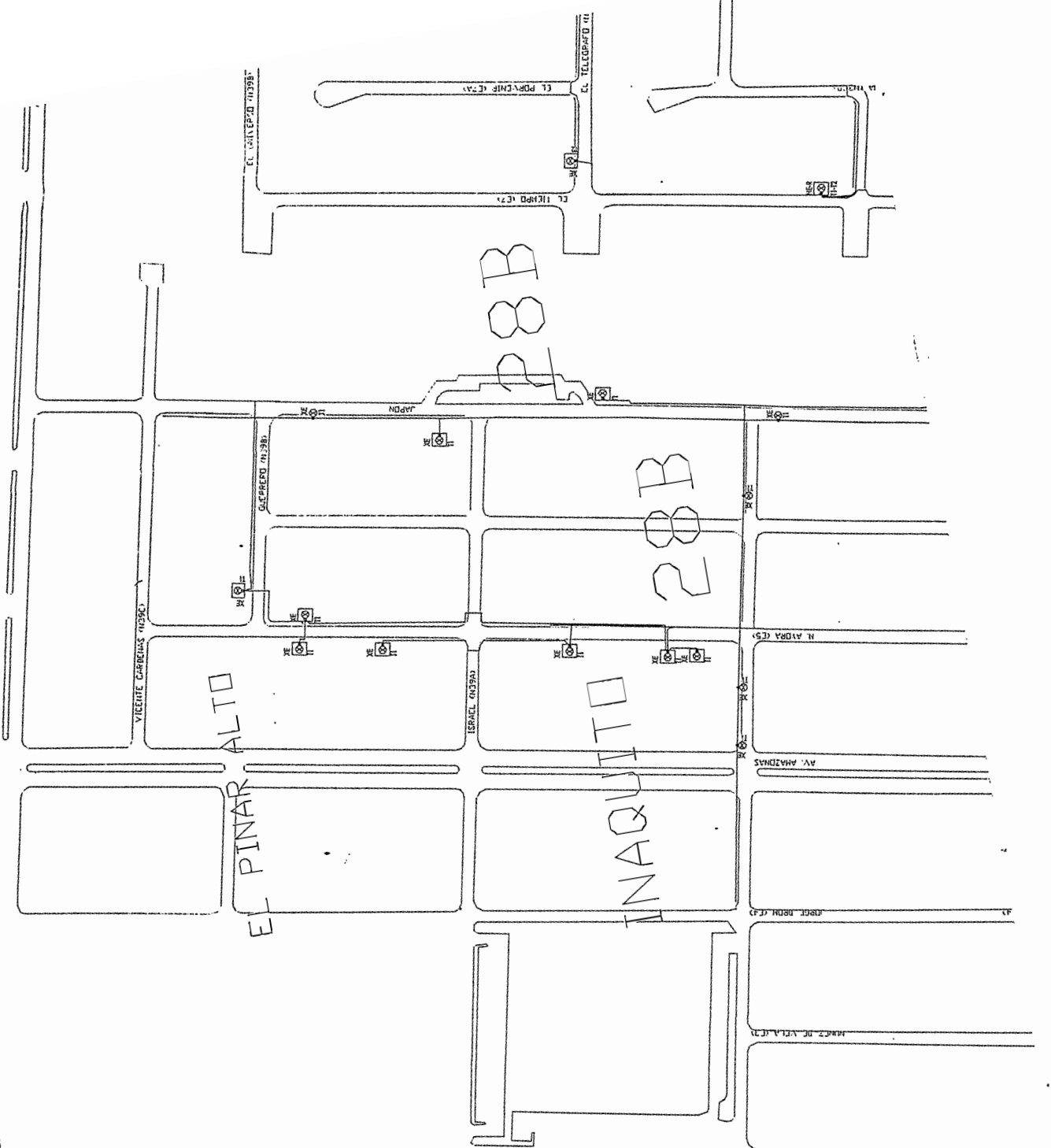
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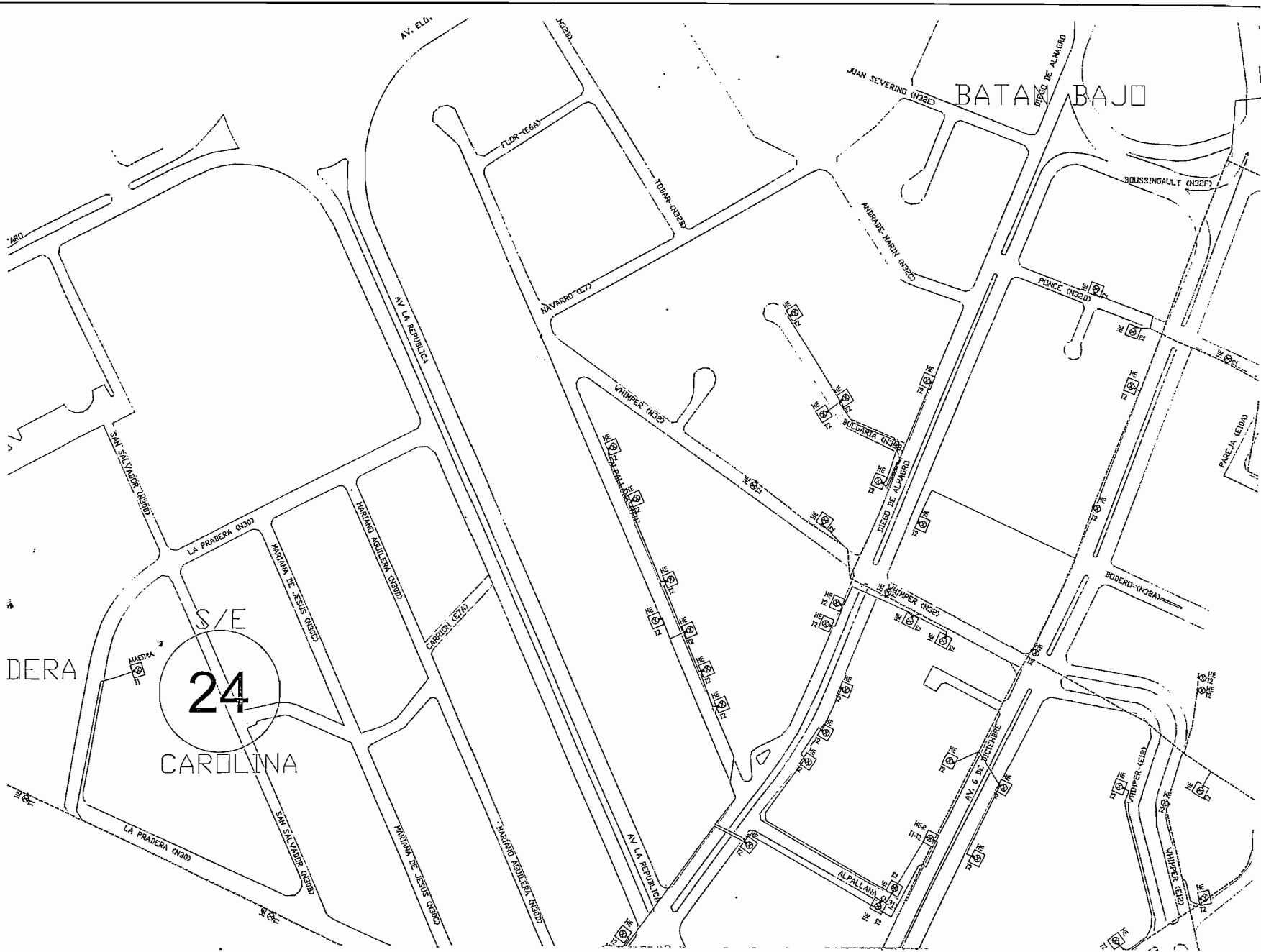
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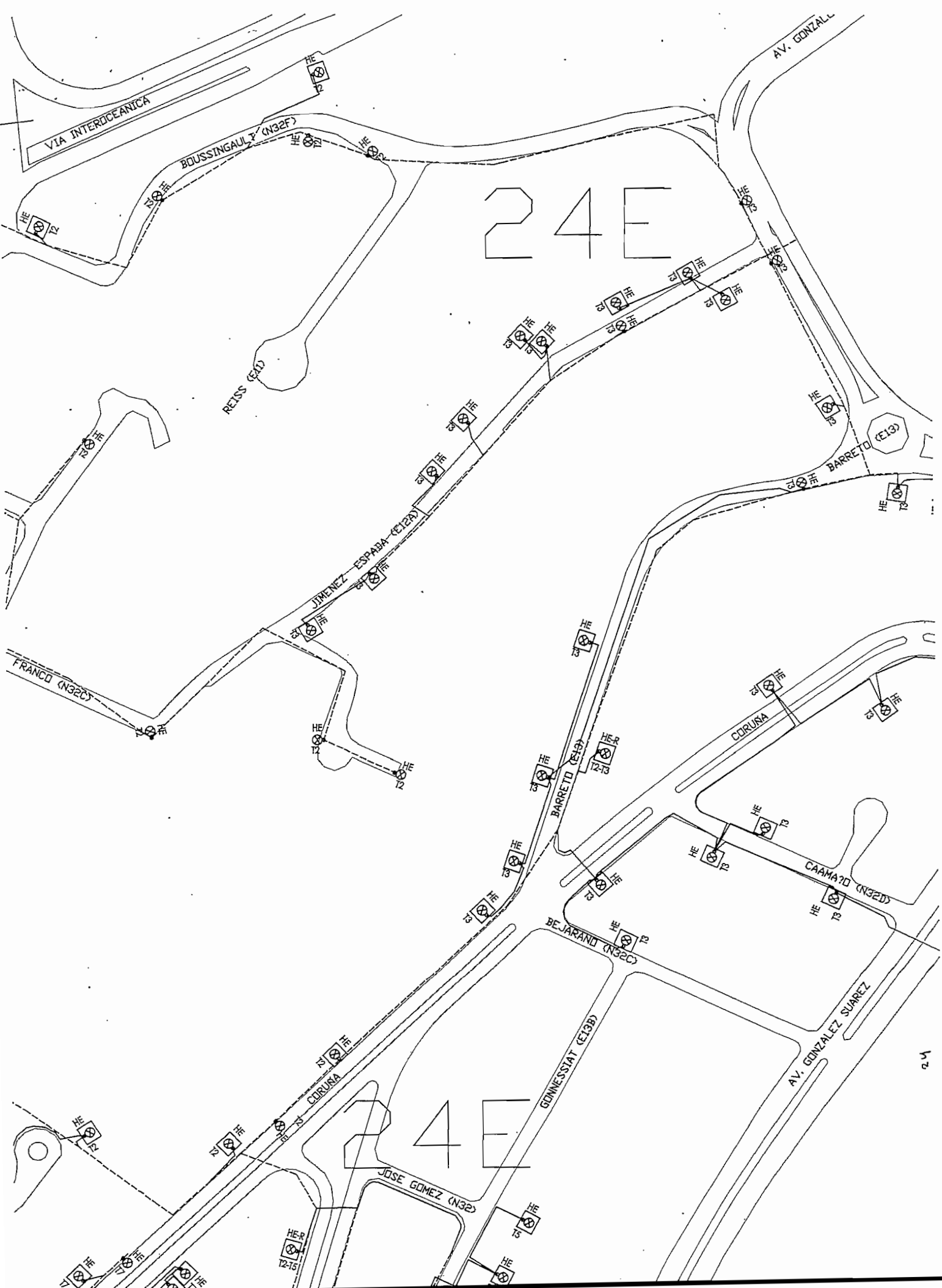
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	RED SUBTERRÁNEA DE MEDIA TENSIÓN
	EMPALME AÉREO EN MEDIA TENSIÓN
	MODULO "X" BPLIC EN CÁMARA DE TRANSFORMACIÓN, CONFIGURACIÓN DE CÁMERA (HE) Y REPETIDOR (R), TRABAJANDO EN RANURAS DE TIEMPO Tg Y Td
	MODULO "X" BPLIC EN POSTE, CONFIGURACIÓN DE CÁMERA (HE) Y REPETIDOR (R), TRABAJANDO EN RANURAS DE TIEMPO Tg Y Td
	MODULO "S" BPLIC EN SUBESTACIÓN, CONFIGURACIÓN COMO MAESTRA, TRABAJANDO EN RANURA DE TIEMPO Tg

ESCUELA POLITECNICA NACIONAL			
CARRERA DE INGENIERÍA EN ELECTRÓNICA Y REDES DE LA INFORMACIÓN			
DISEÑO:	PROYECTO:	DISEÑO DE UN ISP BASADO EN LA TECNOLOGÍA BROADBAND PLC PARA LA EMPRESA ELÉCTRICA QUITO S.A.	
JOSÉ A. CALLE	CHRISTIAN D. BRAVO		
DIBUJO:	CONTIENE:	RED BROADBAND PLC DE MEDIA TENSIÓN PRIMARIO 28B	
JOSÉ A. CALLE CHRISTIAN D. BRAVO			
REVISÓ:	FECHA:	ESCALA:	HOJA:
MSC. ALEX. RODRIGUEZ	JULIO 2006	1:2000	10 DE 13



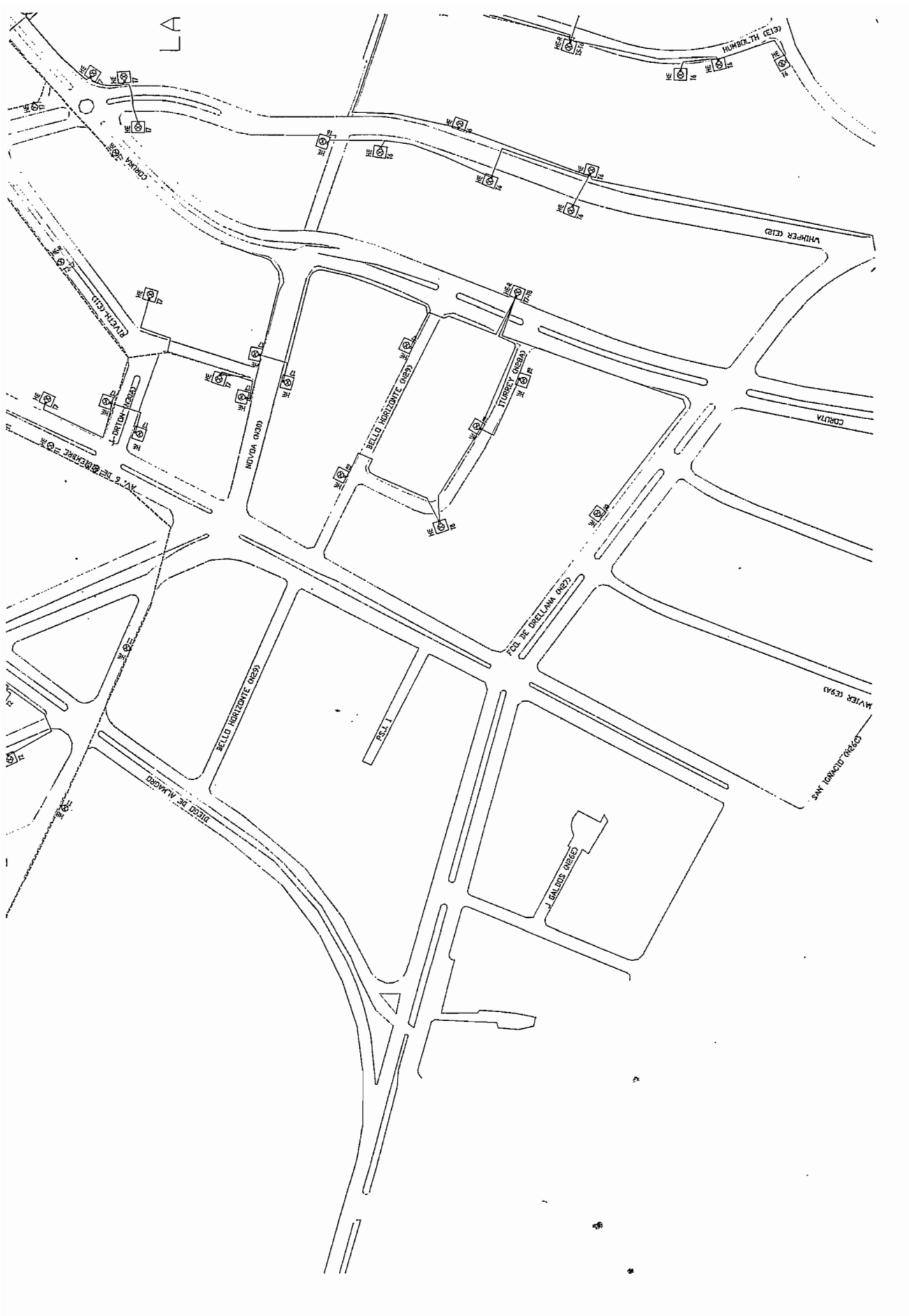






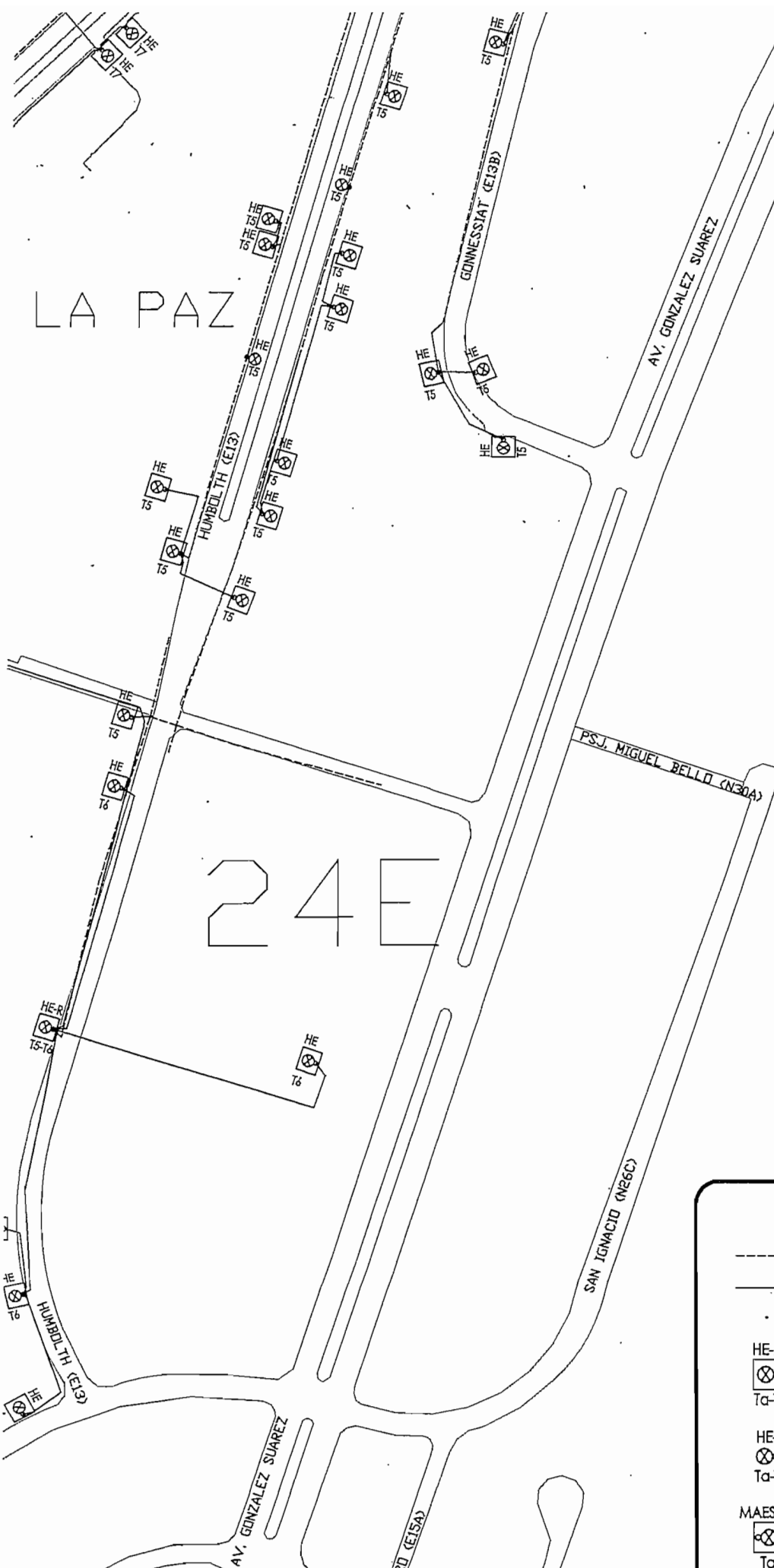
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4E



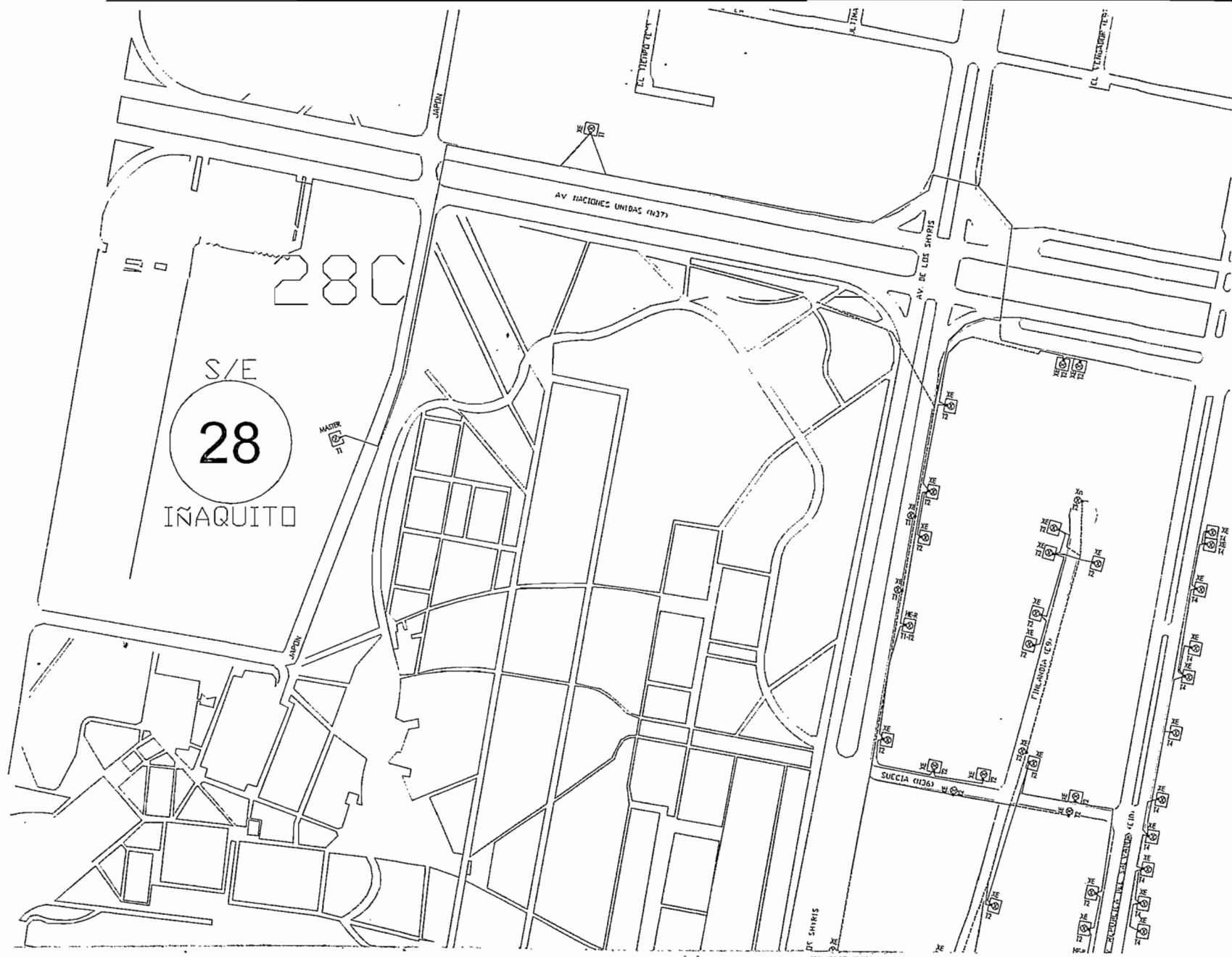
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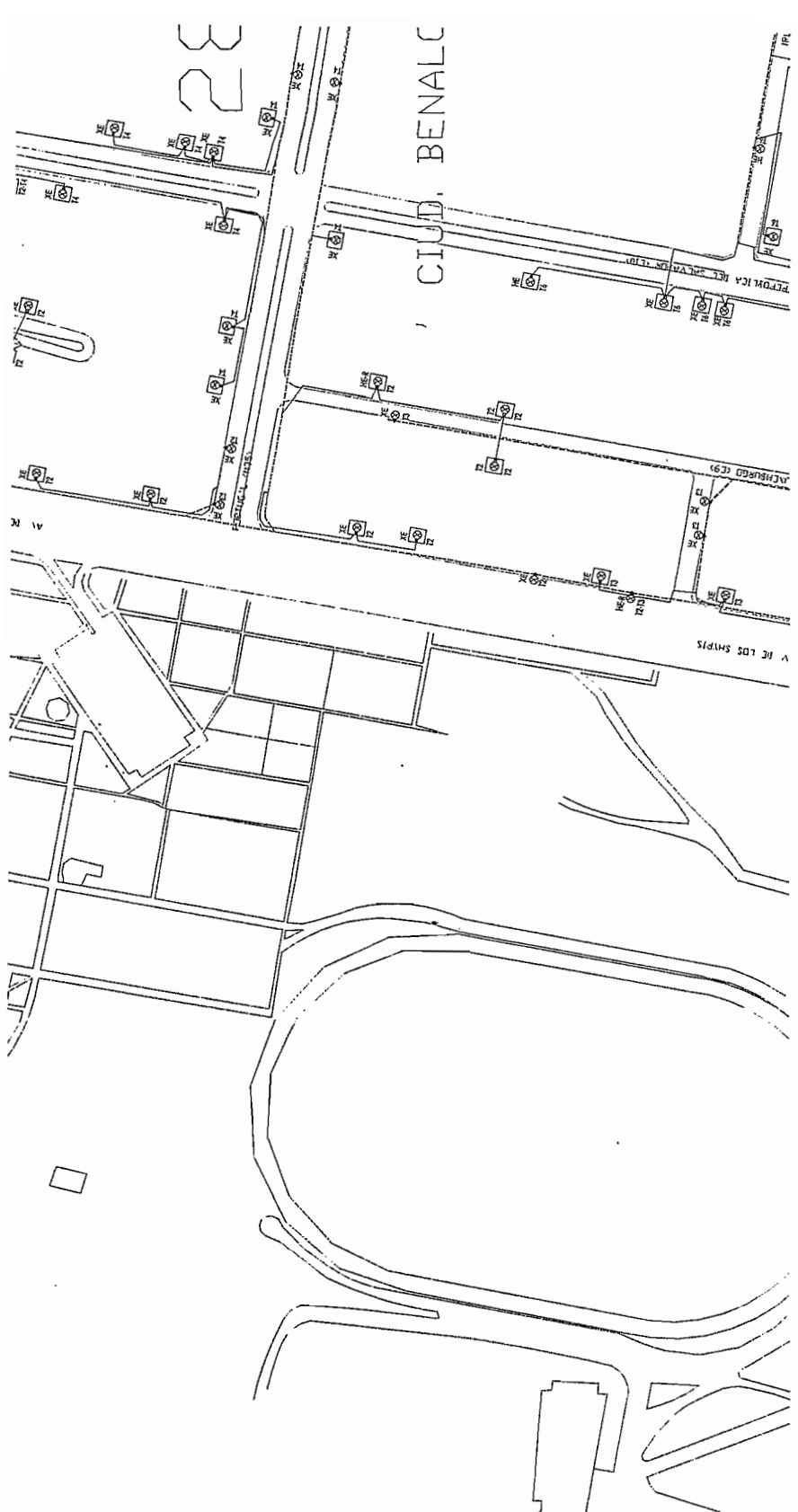


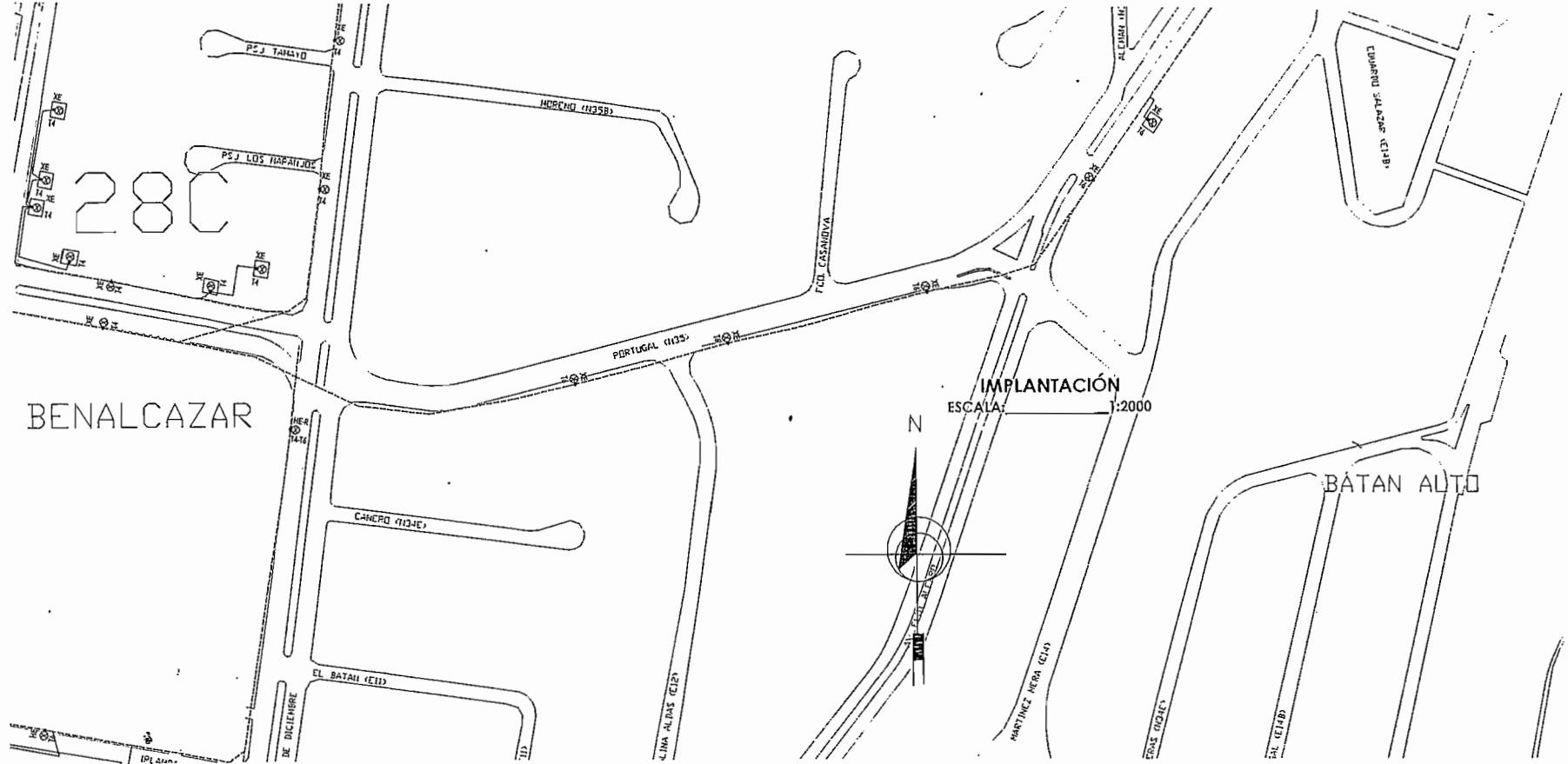
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---	RED AÉREA DE MEDIA TENSIÓN
—	RED SUBTERRANEA DE MEDIA TENSIÓN
•	EMPALME AÉREO EN MEDIA TENSIÓN
HE-R ⊗ Tα-Tβ	NODO "X" BPLC EN CÁMARA DE TRANSFORMACIÓN, CONFIGURACIÓN DE CABECERA (HE) Y REPETIDOR (R), TRABAJANDO EN RANURAS DE TIEMPO Tα Y Tβ
HE-R ⊗ Tα-Tβ	NODO "X" BPLC EN POSTE, CONFIGURACIÓN DE CABECERA (HE) Y REPETIDOR (R), TRABAJANDO EN RANURAS DE TIEMPO Tα Y Tβ
MAESTRA ⊗ Tα	NODO "S" BPLC EN SUBESTACIÓN, CONFIGURACIÓN COMO MAESTRA, TRABAJANDO EN RANURAS DE TIEMPO Tα

24









BENALCAZAR

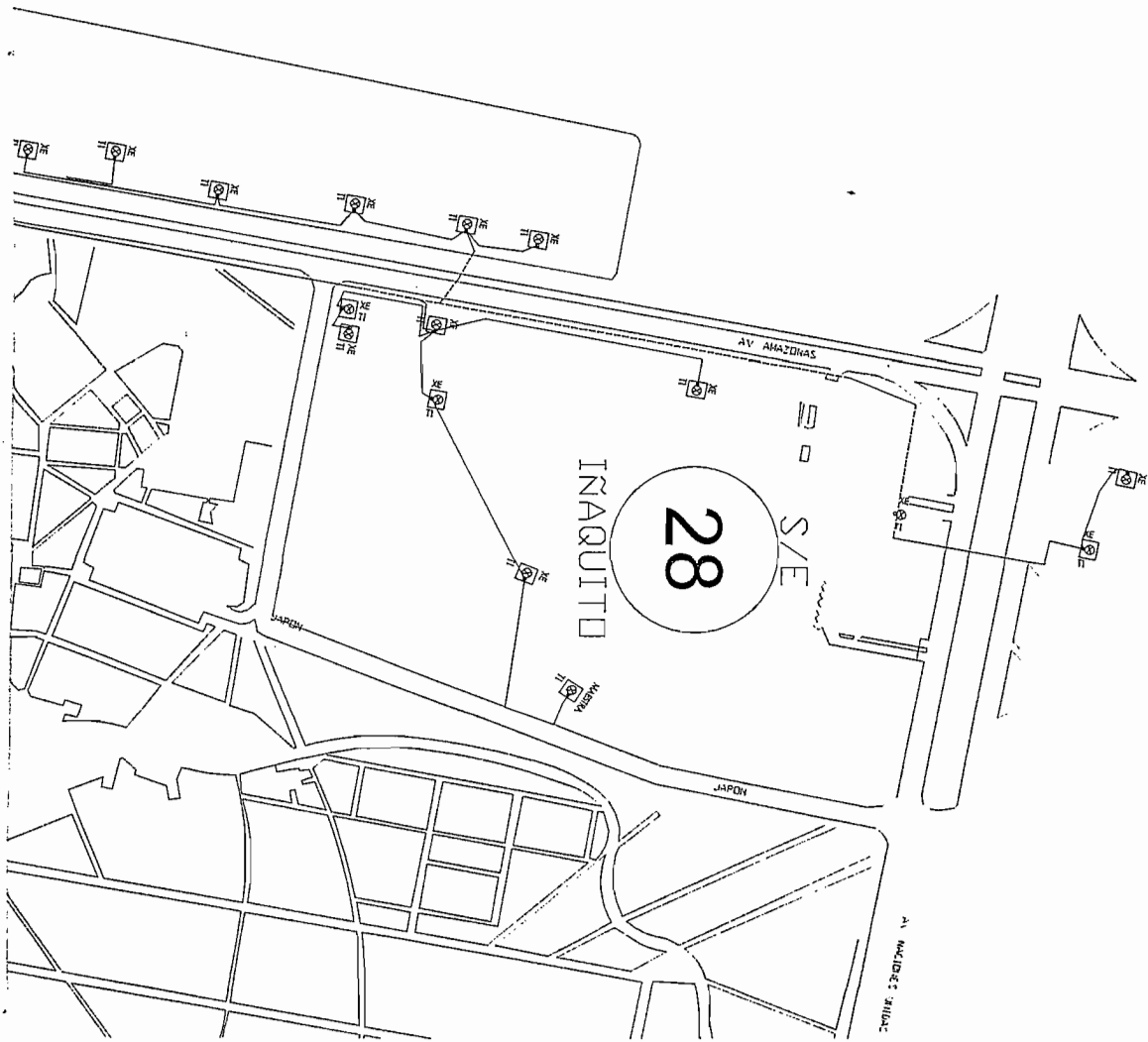
IMPLANTACIÓN
ESCALA: 1:2000

BÁTAN ALTO

SIMBOLOGÍA

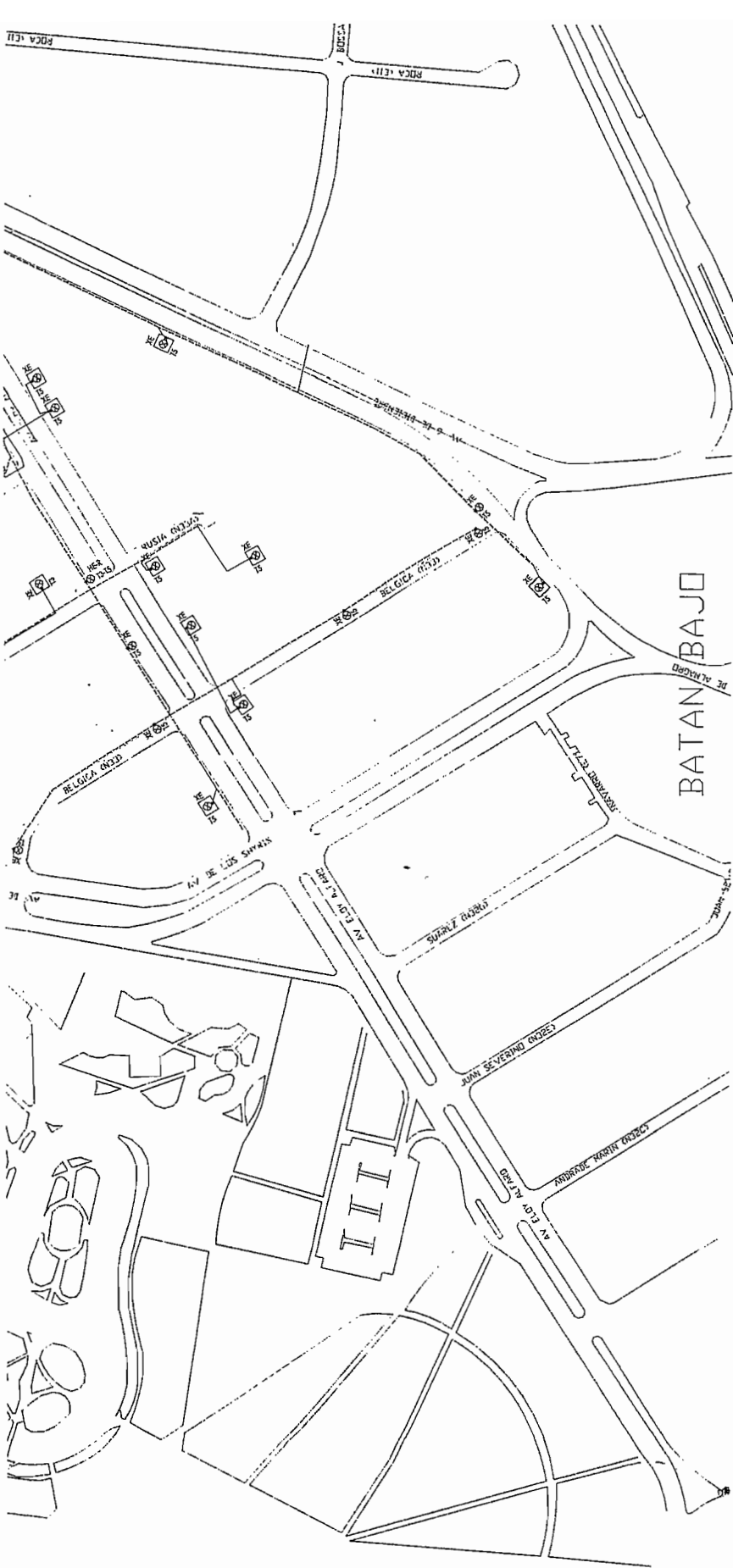
	RED AÉREA DE MEDIA TENSIÓN
	RED SUBTERRANEA DE MEDIA TENSIÓN
	EMPALME AÉREO EN MEDIA TENSIÓN
	MODO "C" 8PLC EN CÁMARA DE TRANSFORMACIÓN, CONFIGURACIÓN DE CASECERA (HE) Y REPELIDOR (RI), TRABAJANDO EN RAMURAS DE TIEMPO Tg Y Tb
	MOODO "C" 8PLC EN POSTE, CONFIGURACIÓN DE CASECERA (HE) Y REPELIDOR (RI), TRABAJANDO EN RAMURAS DE TIEMPO Tg Y Tb
	MOODO "S" 8PLC EN SUBESTACIÓN, CONFIGURACIÓN COMO MAESTRA, TRABAJANDO EN RAMURA DE TIEMPO Tg

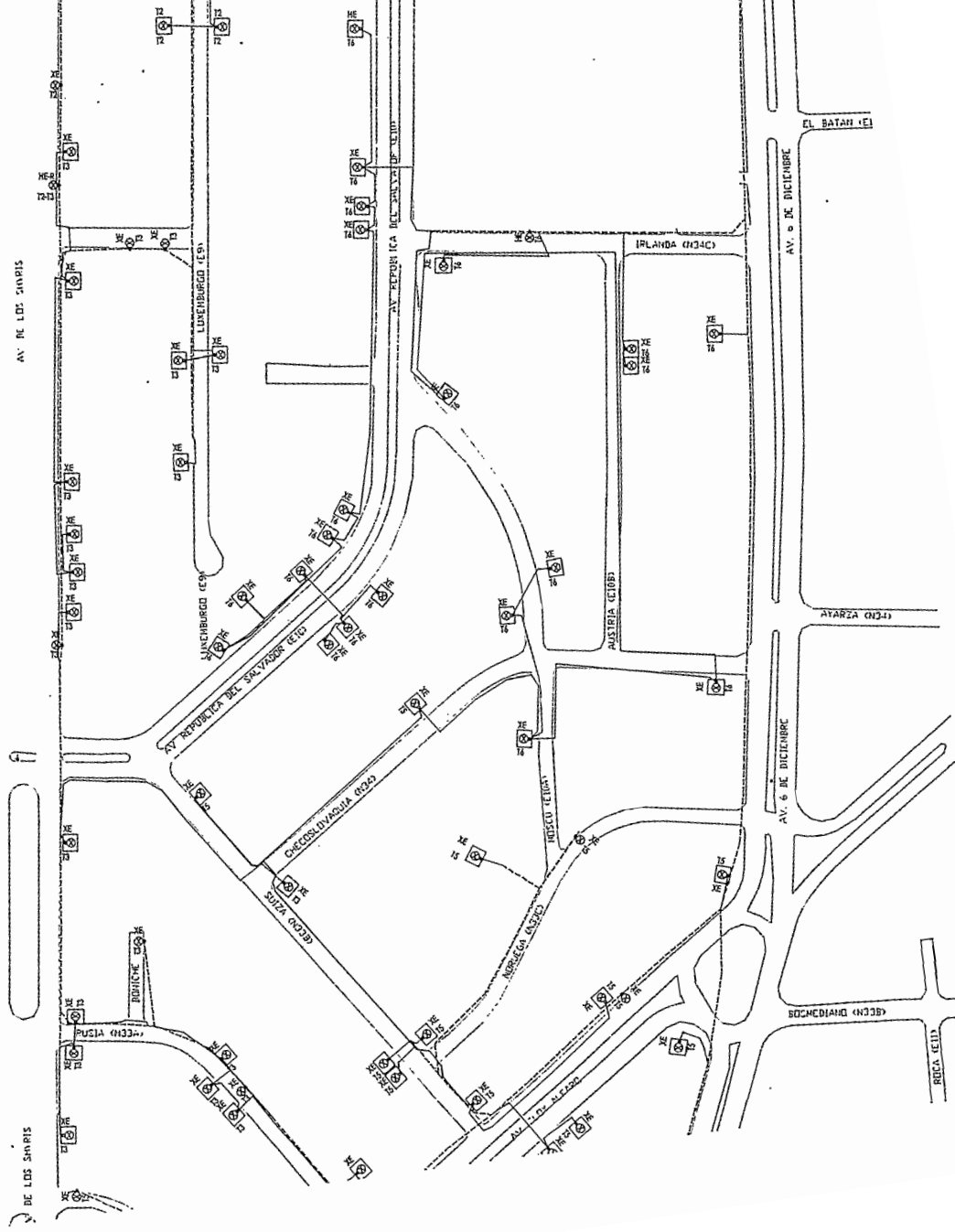
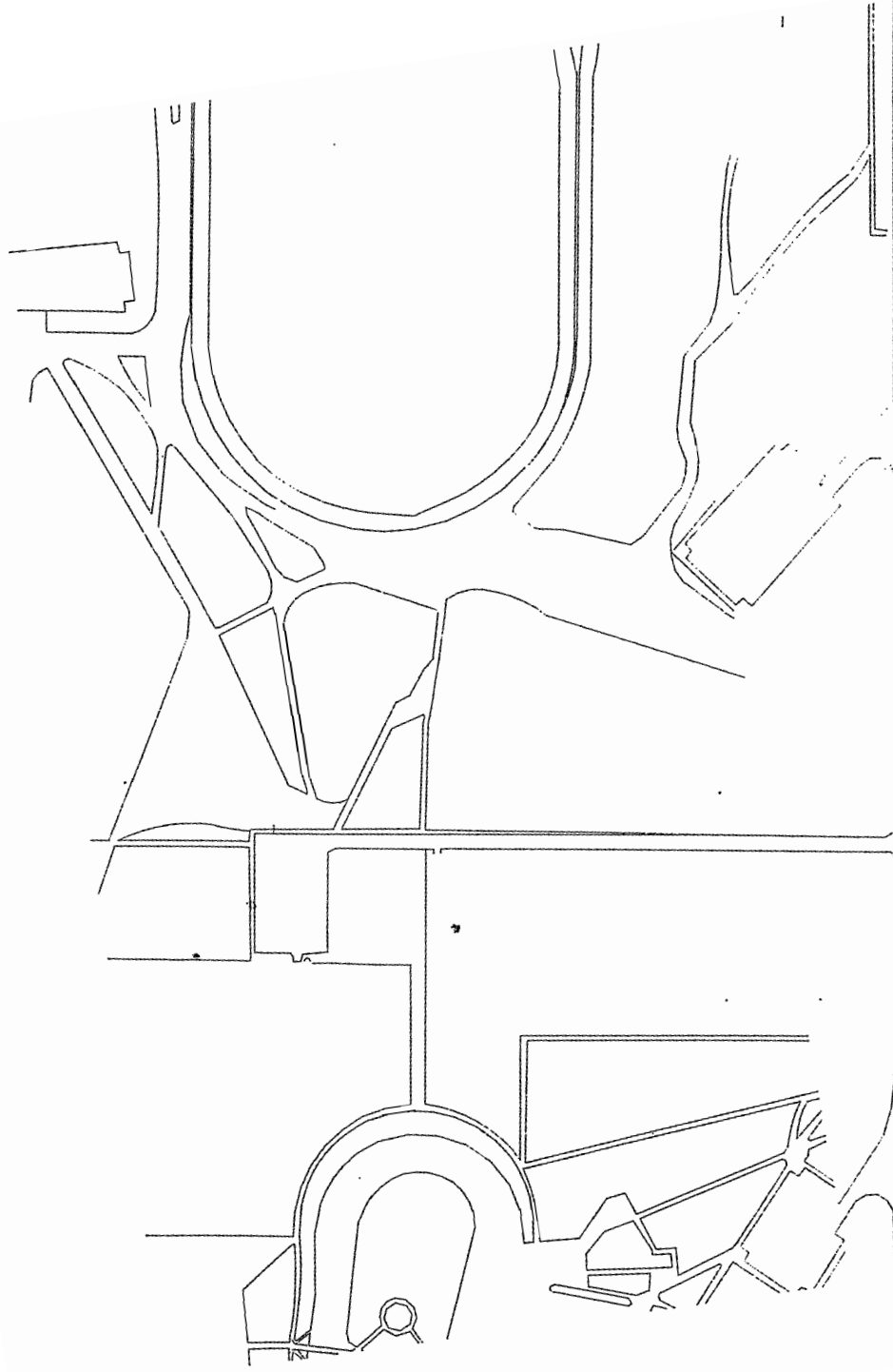
ESCUOLA POLITÉCNICA NACIONAL CARRERA DE INGENIERÍA EN ELECTRÓNICA Y REDES DE LA INFORMACIÓN			
DISEÑO:	PROYECCIÓN:	DISEÑO DE UN ISP BASADO EN LA TECNOLOGÍA BROADBAND PLC PARA LA EMPRESA ELÉCTRICA QUITO S.A.	
JOSÉ A. CALLE	CHRISTIAN D. BRAVO		
DIBUJO:	CONTENIDO:	RED BROADBAND PLC DE MEDIA TENSIÓN PRIMARIO 28C (1/2)	
CHRISTIAN D. BRAVO	MSC. ALEX RODRIGUEZ		
APROBÓ:	FECHA:	ESCALA:	HOJA:
	JULIO 2006	1:2000	11 DE 13



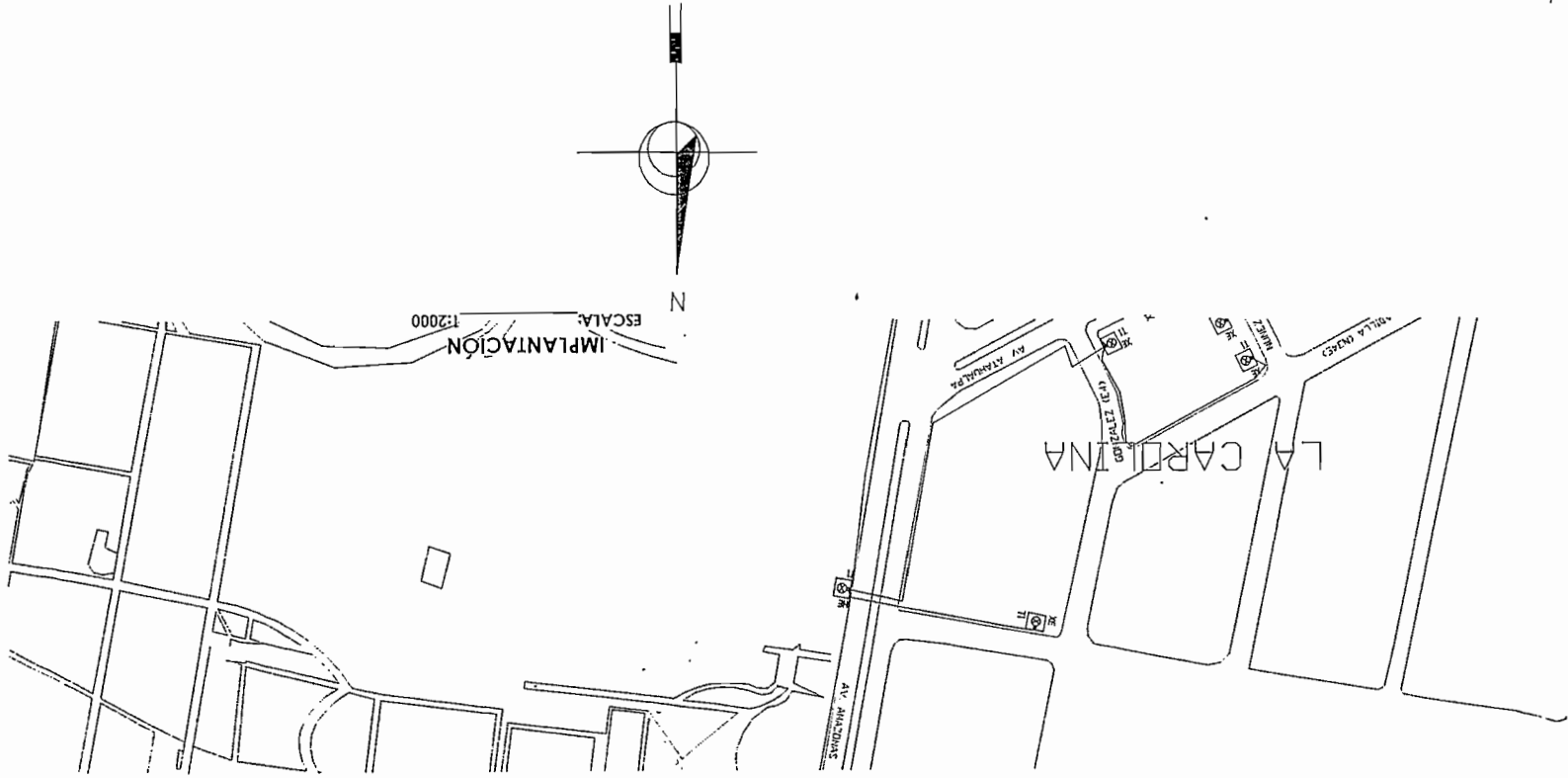


IRAOI



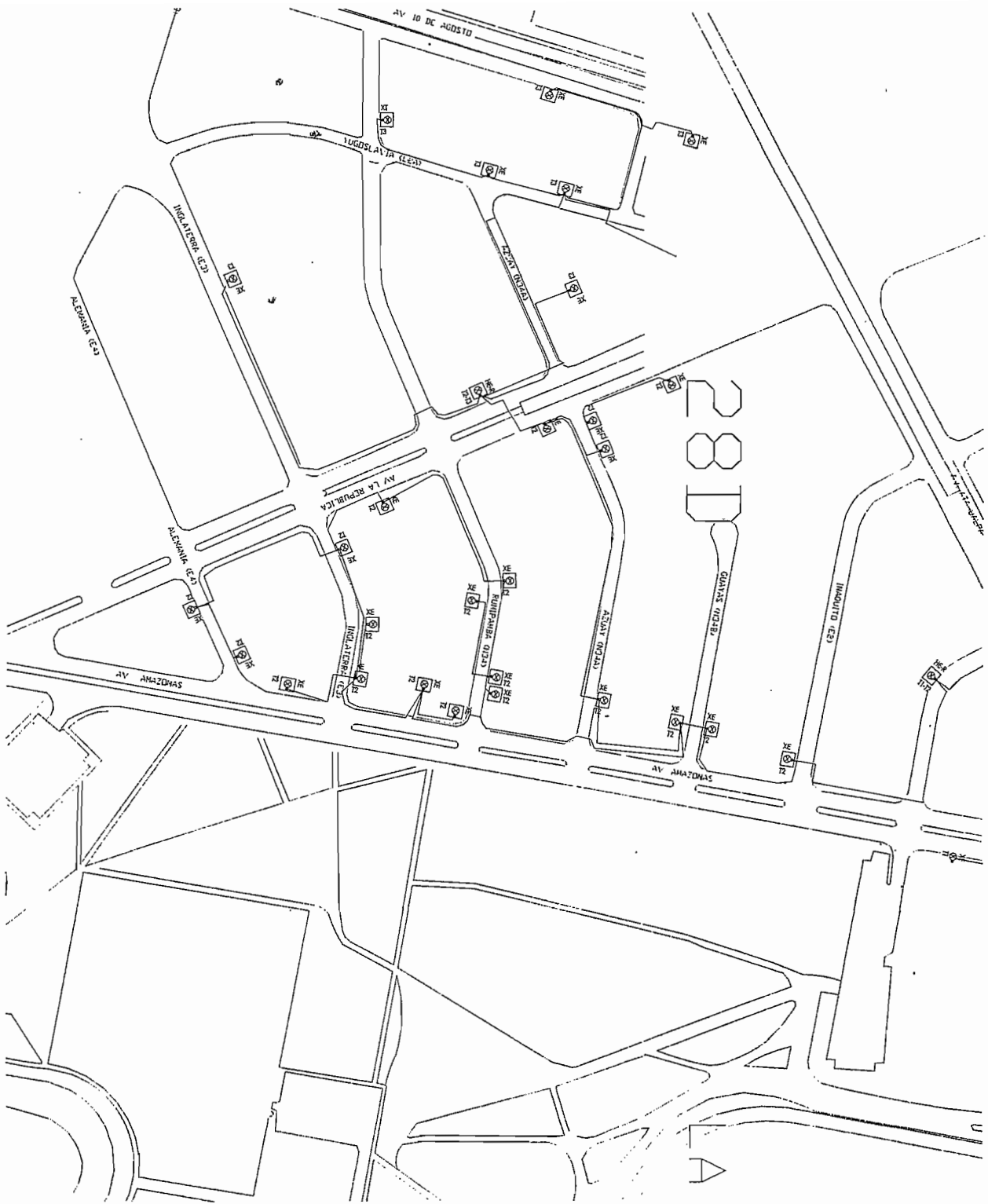


ESCUOLA POLITÉCNICA NACIONAL CARRERA DE INGENIERÍA EN ELECTRÓNICA Y REDES DE LA INFORMACIÓN			
PROYECTO:		DISEÑO DE UN ISP BASADO EN LA TECNOLOGÍA	
CONTENIDO:		BROADBAND PLC PARA LA EMPRESA ELÉCTRICA QUITO S.A.	
DESIGNADO:	CHRISTIAN D. BRAVO	PROYECTADO:	JOSÉ A. CALLE
REVISADO:	JOSÉ A. CALLE CHRISTIAN D. BRAVO	FECHA:	JULIO 2004
AUTOR:		ESCALA:	1:2000
FECHA:		HOJA:	13 DE 13



ESCALA: 1:2000

IMPLANTACIÓN



SCALE 1:500

ANEXO D
Cronograma de actividades y costos
referenciales

CRONOGRAMA DE ACTIVIDADES.....	407
COTIZACIONES.....	408

Figura A-4: Atribución de Frecuencias en el rango típico de operación de Broadband PLC (Fuente: Plan Nacional de Frecuencias y de uso del Espectro Radioeléctrico aprobado mediante resolución 393-18-CONATEL-2000)

Frecuencia (MHz)	Bandwidth (MHz)	Service / Use	Service / Use	Frecuencia (MHz)	Bandwidth (MHz)	Service / Use	Service / Use	Frecuencia (MHz)	Bandwidth (MHz)	Service / Use	Service / Use
20.01	10.003	FREC. PATRON Y SEÑALES HORARIAS	Investigación Especial	19.995	10.005	FREC. PATRON Y SEÑALES HORARIAS	Investigación Especial	19.99	10.01	FREC. PATRON Y SEÑALES HORARIAS	Investigación Especial
21	10.1	FIJO	Móvil	19.995	10.1	FIJO	Móvil	19.99	10.1	FIJO	Móvil
21.45	10.15	AFICIONADOS	RESISTENTE	19.995	10.15	AFICIONADOS	RESISTENTE	19.99	10.15	AFICIONADOS	RESISTENTE
21.85	11.175	Radiofusión (OD)		19.995	11.175	Radiofusión (OD)		19.99	11.175	Radiofusión (OD)	
21.924	11.275	Radiofusión (OD)		19.995	11.275	Radiofusión (OD)		19.99	11.275	Radiofusión (OD)	
22	11.4	MOVIL AERONAUTICO (R)		19.995	11.4	MOVIL AERONAUTICO (R)		19.99	11.4	MOVIL AERONAUTICO (R)	
22.855	11.6	MOVIL AERONAUTICO (R)		19.995	11.6	MOVIL AERONAUTICO (R)		19.99	11.6	MOVIL AERONAUTICO (R)	
23	12.1	FIJO		19.995	12.1	FIJO		19.99	12.1	FIJO	
23.2	12.23	FIJO	Móvil salvo móvil aeronáutico (R)	19.995	12.23	FIJO	Móvil salvo móvil aeronáutico (R)	19.99	12.23	FIJO	Móvil salvo móvil aeronáutico (R)
23.35	13.2	FIJO	Móvil salvo móvil aeronáutico (R)	19.995	13.2	FIJO	Móvil salvo móvil aeronáutico (R)	19.99	13.2	FIJO	Móvil salvo móvil aeronáutico (R)
24	13.26	FIJO	Móvil, Aeropuertos (R)	19.995	13.26	FIJO	Móvil, Aeropuertos (R)	19.99	13.26	FIJO	Móvil, Aeropuertos (R)
24.89	13.36	FIJO	Móvil, salvo móvil aeronáutico	19.995	13.36	FIJO	Móvil, salvo móvil aeronáutico	19.99	13.36	FIJO	Móvil, salvo móvil aeronáutico
24.99	13.41	AFICIONADOS	RESISTENTE	19.995	13.41	AFICIONADOS	RESISTENTE	19.99	13.41	AFICIONADOS	RESISTENTE
25.005	13.57	AFICIONADOS	RESISTENTE	19.995	13.57	AFICIONADOS	RESISTENTE	19.99	13.57	AFICIONADOS	RESISTENTE
25.01	14	AFICIONADOS	RESISTENTE	19.995	14	AFICIONADOS	RESISTENTE	19.99	14	AFICIONADOS	RESISTENTE
25.07	14.25	AFICIONADOS	RESISTENTE	19.995	14.25	AFICIONADOS	RESISTENTE	19.99	14.25	AFICIONADOS	RESISTENTE
25.21	14.35	AFICIONADOS	RESISTENTE	19.995	14.35	AFICIONADOS	RESISTENTE	19.99	14.35	AFICIONADOS	RESISTENTE
25.55	14.99	FIJO	Móvil, salvo móvil aeronáutico	19.995	14.99	FIJO	Móvil, salvo móvil aeronáutico	19.99	14.99	FIJO	Móvil, salvo móvil aeronáutico
25.67	15.005	Radiofusión (OD)		19.995	15.005	Radiofusión (OD)		19.99	15.005	Radiofusión (OD)	
26.1	15.01	Radiofusión (OD)		19.995	15.01	Radiofusión (OD)		19.99	15.01	Radiofusión (OD)	
26.175	15.1	Radiofusión (OD)		19.995	15.1	Radiofusión (OD)		19.99	15.1	Radiofusión (OD)	
26.965	15.8	MOVIL AERONAUTICO (R)		19.995	15.8	MOVIL AERONAUTICO (R)		19.99	15.8	MOVIL AERONAUTICO (R)	
27.405	16.36	MOVIL AERONAUTICO (R)		19.995	16.36	MOVIL AERONAUTICO (R)		19.99	16.36	MOVIL AERONAUTICO (R)	
27.5	17.41	FIJO	Móvil, salvo móvil aeronáutico	19.995	17.41	FIJO	Móvil, salvo móvil aeronáutico	19.99	17.41	FIJO	Móvil, salvo móvil aeronáutico
28	17.48	AFICIONADOS	RESISTENTE	19.995	17.48	AFICIONADOS	RESISTENTE	19.99	17.48	AFICIONADOS	RESISTENTE
29.7	17.9	AFICIONADOS	RESISTENTE	19.995	17.9	AFICIONADOS	RESISTENTE	19.99	17.9	AFICIONADOS	RESISTENTE
30	17.97	AFICIONADOS	RESISTENTE	19.995	17.97	AFICIONADOS	RESISTENTE	19.99	17.97	AFICIONADOS	RESISTENTE
	18.03	AFICIONADOS	RESISTENTE	19.995	18.03	AFICIONADOS	RESISTENTE	19.99	18.03	AFICIONADOS	RESISTENTE
	18.052	AFICIONADOS	RESISTENTE	19.995	18.052	AFICIONADOS	RESISTENTE	19.99	18.052	AFICIONADOS	RESISTENTE
	18.068	AFICIONADOS	RESISTENTE	19.995	18.068	AFICIONADOS	RESISTENTE	19.99	18.068	AFICIONADOS	RESISTENTE
	18.168	AFICIONADOS	RESISTENTE	19.995	18.168	AFICIONADOS	RESISTENTE	19.99	18.168	AFICIONADOS	RESISTENTE
	18.78	AFICIONADOS	RESISTENTE	19.995	18.78	AFICIONADOS	RESISTENTE	19.99	18.78	AFICIONADOS	RESISTENTE
	18.9	AFICIONADOS	RESISTENTE	19.995	18.9	AFICIONADOS	RESISTENTE	19.99	18.9	AFICIONADOS	RESISTENTE
	19.02	AFICIONADOS	RESISTENTE	19.995	19.02	AFICIONADOS	RESISTENTE	19.99	19.02	AFICIONADOS	RESISTENTE
	19.68	AFICIONADOS	RESISTENTE	19.995	19.68	AFICIONADOS	RESISTENTE	19.99	19.68	AFICIONADOS	RESISTENTE
	19.8	AFICIONADOS	RESISTENTE	19.995	19.8	AFICIONADOS	RESISTENTE	19.99	19.8	AFICIONADOS	RESISTENTE
	19.99	AFICIONADOS	RESISTENTE	19.995	19.99	AFICIONADOS	RESISTENTE	19.99	19.99	AFICIONADOS	RESISTENTE
	19.995	AFICIONADOS	RESISTENTE	19.995	19.995	AFICIONADOS	RESISTENTE	19.99	19.995	AFICIONADOS	RESISTENTE
	20.01	AFICIONADOS	RESISTENTE	19.995	20.01	AFICIONADOS	RESISTENTE	19.99	20.01	AFICIONADOS	RESISTENTE



Dirección: Av. Orellana 1698 y 9 de Octubre
 Teléfonos: 504-153 / 505-375 / 505-397
 TeleFax: 501-348
 Celulares: 09/ 558 - 824 /25 /26 /27



CENTRO AUTORIZADO
 DE SOPORTE



COTIZACION

CLIENTE: David Bravo

FECHA: 15-02-2006


Cantidad	Descripción	P. Unitario	P. Total
1	Servidor de Red ProLiant DNS MAESTRO ML 110G3 SCSI TOWER Procesador PENTIUM IV 3.2Ghz.(SOPORTA 1 PROCESADOR) 512 GB. De Memoria RAM exp. A 4GB 2 DISCO 36.2 GB NON HOT PLUG Floppy Drive de 3.5", 1.44 MB. CD-ROM 48X IDE Tarjeta de Red NET 10/100/1000 MONITOR HP 17" CRT Teclado 101 teclas, español Mouse 2 botones Puertos : 1 seriales, 1 paralelo, 3 USB, NETWORK RJ-45,Y EXTERNAL SCSI KNOCKOUTS COMPATIBLE CON RED HAT LINUX ENTREPRISE 4	1,793.00	1,793.00
1	Servidor de Red ProLiant DNS ESCLAVO ML 110G3 SCSI TOWER Procesador PENTIUM IV 3.2Ghz.(SOPORTA 1 PROCESADOR) 512 GB. De Memoria RAM exp. A 4GB 1 DISCO 36.2 GB NON HOT PLUG Floppy Drive de 3.5", 1.44 MB. CD-ROM 48X IDE Tarjeta de Red NET 10/100/1000 Teclado 101 teclas, español Mouse 2 botones Puertos : 1 seriales, 1 paralelo, 3 USB, NETWORK RJ-45,Y EXTERNAL SCSI KNOCKOUTS COMPATIBLE CON RED HAT LINUX ENTREPRISE 4	850.00	850.00
1	Servidor de Red ProLiant WEB CACHE ML 110G3 SCSI TOWER Procesador PENTIUM IV 3.2Ghz.(SOPORTA 1 PROCESADOR) 512 GB. De Memoria RAM exp. A 4GB 1 DISCO 36.2 GB NON HOT PLUG Floppy Drive de 3.5", 1.44 MB. CD-ROM 48X IDE Tarjeta de Red NET 10/100/1000 TARJETA DE RED ADICIONAL 3 COM 10/100 MONITOR HP 17" CRT Teclado 101 teclas, español Mouse 2 botones Puertos : 1 seriales, 1 paralelo, 3 USB, NETWORK RJ-45,Y EXTERNAL SCSI KNOCKOUTS COMPATIBLE CON RED HAT LINUX ENTREPRISE 4	1,010.00	1,010.00
1	Servidor de Red ProLiant CORREO ELECTRONICO ML 150G2 SCSI TOWER Procesador INTEL XEON 3.2Ghz. 512 GB. De Memoria RAM exp. A 4GB 3 DISCO 146 GB 10K U320 SCSI NON HOT PLUG Floppy Drive de 3.5", 1.44 MB. CD-ROM 48X IDE Tarjeta de Red NET 10/100/1000 MONITOR HP 17" CRT Teclado 101 teclas, español Mouse 2 botones Puertos : 1 seriales, 1 paralelo, 3 USB, NETWORK RJ-45,Y EXTERNAL SCSI KNOCKOUTS COMPATIBLE CON RED HAT LINUX ENTREPRISE 4	3,386.00	3,386.00
1	Servidor de Red ProLiant DE AUTENTICACIÓN ML 110G3 SCSI TOWER Procesador PENTIUM IV 3.2Ghz.(SOPORTA 1 PROCESADOR) 512 GB. De Memoria RAM exp. A 4GB 1 DISCO 36.2 GB NON HOT PLUG Floppy Drive de 3.5", 1.44 MB. CD-ROM 48X IDE Tarjeta de Red NET 10/100/1000 TARJETA DE RED ADICIONAL 3 COM 10/100 Teclado 101 teclas, español Mouse 2 botones Puertos : 1 seriales, 1 paralelo, 3 USB, NETWORK RJ-45,Y EXTERNAL SCSI KNOCKOUTS COMPATIBLE CON RED HAT LINUX ENTREPRISE 4	880.00	880.00

Cantidad	Descripción	P. Unitario	P. Total
1	Servidor de Red ProHant DE TARIFACION ML 110G3 SCSI TOWER Procesador PENTIUM IV 3.2Ghz.(SOPORTA 1 PROCESADOR) 512 GB. De Memoria RAM exp. A 4GB 1 DISCO 36.2 GB NON HOT PLUG Floppy Drive de 3.5", 1.44 MB. CD-ROM 48X IDE MONITOR HP 17" CRT Tarjeta de Red NET 10/100/1000 Teclado 101 teclas, español Mouse 2 botones Puertos : 1 seriales, 1 paralelo, 3 USB, NETWORK RJ-45, Y EXTERNAL SCSI KNOCKOUTS WINDOWS 2003 SERVER + 5 CALS	1,730.00	1,730.00
1	Servidor de Red ProHant ADMINISTRACION ML 110G3 SCSI TOWER Procesador PENTIUM IV 3.2Ghz.(SOPORTA 1 PROCESADOR) 512 GB. De Memoria RAM exp. A 4GB 1 DISCO 36.2 GB NON HOT PLUG Floppy Drive de 3.5", 1.44 MB. CD-ROM 48X IDE Tarjeta de Red NET 10/100/1000 MONITOR HP 17" CRT Teclado 101 teclas, español Mouse 2 botones Puertos : 1 seriales, 1 paralelo, 3 USB, NETWORK RJ-45, Y EXTERNAL SCSI KNOCKOUTS COMPATIBLE CON RED HAT LINUX ENTREPRISE 4	840.00	840.00
2	SWITCH 3COM 24 PUERTOS 10/100 Y 2 PUERTOS GIGA BIT ADMINISTRABLE	357.00	714.00
3	SWITCH NEXXT 8 PUERTOS	27.00	81.00
1	LICENCIA WINDOWS 2003 SERVER (INCLUYE 5 CALS)	750.00	750.00
1	LICENCIA OFFICE 2003 PROFESSIONAL	350.00	350.00
1	FIREWALL 100 MBPS (POR CONFIRMAR)	0.00	0.00
2	SISTEMAS DE DETECCIÓN DE INTRUSOS DE RED (POR CONFIRMAR)	0.00	0.00
		SUBTOTAL	12,384.00
		IVA 12%	1486.08
		TOTAL	13,870.08

Garantía: El servidor ML350G4 3 años Contra defectos de fabricación
 El servidor ML110 SCSI 1 año Contra defectos de fabricación

Validez de la oferta : 20 días
 Tiempo de entrega : 30 DÍAS BAJO PEDIDO, INMEDIATA PREVIA REVISIÓN DE STOCK
 Forma de pago: 50% orden de compra, 50% contra entrega

Atentamente



FABIAN CALAPAQUI
 ASESOR COMERCIAL
 INFOLINK Cia. Ltda.,



MARTELCABLECOM
conectando su mundo

HOJA 1 DE 1

PROPUESTA ECONOMICA

Identificación # 1

Dirigido a: ING. DAVID BRAVO

Fecha: 23-Feb-06

Atención: ING. DAVID BRAVO

Dirección: QUITO-ECUADOR

Teléfonos: _____

email: _____

Cantidad	Código	Descripción	Unidad	Precio Unitario	Total
1	DLK-DMC-300SC	10/100Base-TX to 100Base-FX Media Converter with Multi-mode SC F	UND	\$102.35	\$102.35
1	DLK-DMC-515SC	10/100Base-TX to 100Base-FX Media Converter with Single-mode 15 k	UND	\$166.09	\$166.09
				SUMAN	\$268.44
				IVA	\$32.21
				TOTAL	\$300.65

Forma de Pago:	A CONVENIR	Tiempo de Entrega:	A CONVENIR
----------------	------------	--------------------	------------

Plazo: 8 DÍAS

Firma: _____

ING. SANTIAGO GUDIÑO
SOPORTE NETWORKING
Tlf: 225-6217 / 225-6218 ext.120

Para mayor información de las características técnicas de los equipos en: <http://www.dlinkla.com>



Quito Dm, Marzo 3 del 2006

Señores:
ISP
Presente.-

Atención: **Ing. José Andrés Calle**

Estimado Ing. Calle:

Por el presente quienes hacemos **LAARCOM** queremos enviarle nuevamente nuestros sinceros saludos, para luego exponerle la configuración definitiva del Proyecto de Control de Accesos y alarma para el centro de computo sujeto de instalación

Esta configuración presenta un sistema de control de accesos basado en tecnología de proximidad perfectamente integrado entre sí y que podrá ser controlado incluso desde la red LAN de la empresa, el mismo que podrá registrar quien entra, quien sale, a que hora en los sitios planificados para ello y sobre todo que permita optimizar recursos y tiempo de instalación a más de obtener reportes de estos y más eventos en un archivo de texto que puede ser convertido en un archivo Excel.

Con esta consideración se explicará la configuración del proyecto el cual solo constará de una fase la cual representa el primer filtro de acceso y que estará ubicado en:

- Centro de Computo.

CONTROL DE ACCESOS

La configuración del sistema de control de accesos, plantea un control total de horarios identificatorios de entradas y salidas de la puerta a través de tecnología de proximidad, la misma que permitirá la apertura de la puerta con la presentación de una tarjeta, y para validar que todo acceso sea real se manejará la opción de ANTIPASSBACK, misma que implica que nadie podrá salir si no ha entrado y viceversa.

IMPORTANTE

Esta nueva configuración permitirá a mediano o largo plazo ampliarse para controlar hasta 256 puertas con la adición de módulos adicionales.

Se adicionará un push botton en la puerta para aperturas autorizadas a esta área.

CENTRO DE COMPUTO

CANT	ITEM	DESCRIPCION	V/UNIT	P/VENTA
1	PXL-500W	panel de control de acceso para dos lectoras, una puerta posee Interface RS232 para comunicaci3n con el PC	750	750
2	P-500	lectoras de proximidad	202,27	404,54
1	LAN-520	m3dulo para acceso por LAN	284	284
1	Fuente	Fuentes de Poder de 13,8 VDC, 2AMP	50	50
1	Bat7	Batería 7 amp de respaldo	16	16
1	TR16	Transformador 1640V	10	10
50	PSC-1	Tarjetas de proximidad	4	200
1	GAB	Gabinete para fuente	12	12
1	CEM	Cerradura 600lbs	153	153
1	PB	push botton	10	10
<i>Instalaci3n, Programaci3n y Puesta en Marcha</i>				347
<i>Inversi3n</i>			TOTAL:	2236,54

Estos Valores no Incluyen el Iva

CENTRO DE COMPUTO

CANT	ITEM	DESCRIPCION	V/UNIT	P/VENTA
1	CA4-10Z	Central de alarma de 4 a 10 zonas, teclado LCD	99	99
1	BAT 4AH	Batería 4 amperios	12,5	12,5
1	TR1640	Transformador 1640	10	10
1	CMN	contacto magn3tico normal	3	3
1	DMI	detector infrarrojo de movimiento	17	17
1	SIR15	sirena de 15 watts decorativa	9	9
<i>Instalaci3n, Programaci3n y Puesta en Marcha</i>				48
<i>Inversi3n</i>			TOTAL:	198,5

Estos Valores no Incluyen el Iva

Beneficios Principales

- Eliminaci3n de llaves para aperturas de puerta.
- Registro de horarios de entrada y salida de cada una de las 3reas controladas.
- gesti3n de antipassback lo que permitir3 que no hayan registros ni eventos falsos
- Restricci3n de accesos por horarios, fechas, personas y grupos de personas.
- Acceso LAN.
- Emisi3n de reportes para adaptarlos a un sistema de control administrativo y de RRHH.
- Este sistema puede ser ampliado a medida como vayan creciendo los requerimientos de control de accesos a 3reas restringidas simplemente con la adici3n de controladores adicionales.

Elaborado por:

Ing. Luis Rojas V.
Jefe de Ventas
LAARCOM



Estimado Andrés,
Adjunto estoy enviando la cotización de la central Siemens solicitada.
He cotizado 2 tipos de correos de voz, la diferencia radica principalmente en el tiempo de grabación, y usuarios del correo.
Además he cotizado un teléfono de cada modelo para que usted lo revise y me indique cual de estos sería el que le interese.
Cualquier duda que tenga respecto a esta cotización por favor no dude en contactarme.

Saludos cordiales,

Servidor de Comunicaciones HiPath 1100 V5.1 para Proyecto ISP

Oferta Económica

Fecha: 16/02/06				
Oferta No. 06-02-16				
Pos.	Cant.	Descripción	Precio unitario USD	Precio total USD
1 Servidor de Comunicaciones				
Hardware y Software				
	1	Servidor de Comunicaciones Siemens HiPath 1100 V5.1 modelo HiPath 1130		
	16	Periferia Extensiones analógicas a/b		
	6	Líneas troncales analógicas		
TOTAL POSICIÓN 1				863,00
	1	EAR 5000 4 Lines, 8 mbox, 3 hours recording time	1.002,85	1.002,85
	1	EAR 2000 2 lines, 9 minutes recording time	347,57	347,57
	1	Profiset 3030 (manganeso)	122,00	122,00
	1	Euroset 3015 (manganeso)	52,60	52,60
	1	Euroset 3005 (manganeso)	20,00	20,00
TOTAL POSICIÓN 2				1.667,02
	1	Instalación y Programación		250,00
TOTAL POSICIÓN 3				250,00
OFERTA TOTAL POSICIONES 1, 2 y 3				2.780,02

Observaciones:

Precios: Dólares, no incluye IVA

Forma de pago: 70% anticipo con la orden de compra y 30% contra entrega de la central funcionando

Tiempo de entrega: Inmediata de la central y teléfonos, salvo previa venta, correo de voz según disponibilidad

En espera que esta cotización sea de su conformidad, me suscribo

Atentamente,

Gina Mosquera L.
Netsis S.A

Pasaje Carlos Tamayo 142 y 6 de Diciembre

Tel: 593, 2 2433154/2435905/2257439

www.netsissa.com

Quito, Ecuador



Imprimir - Cerrar ventana

Para: "Jose Andres Calle" <joseandrescalle@yahoo.com>
Asunto: Antwort: Information required from Empresa Eléctrica Quito S.A.
De: "Bruno Zaugg" <bruno.zaugg@currenttechnologies.com>
Fecha: Wed, 1 Mar 2006 11:38:59 +0100

Dear Jose

Thanks for your mail - it's a busy time at the moment, especially as per our merger that has been announced yesterday (reference is made to www.ascom.com/powerline).

However please find hereafter some budgetary prices for the requested project:

- For most of our home user in the trial area we request about 500 modems APC-2000-DA and 600 modems APA-2000-DB.

-> we recommend to use the more convenient and cost saving unit APA-2000-DB only: budgetary price around 125 EUR / unit

- For some corporate user and home user with special requirements we request 300 gateways API-2000-GW and 900 modems APC-2000-DA

-> the gateway devices are available at 380 EUR / unit, for the modems see comment 1

- We request to work within 116 X-nodes, ! for which we need the cost of 116 API-2000-LV and 116 API-2000-MV.

-> both devices are available at 1'080 EUR / unit

- We are also interested in any management software for this network that your organization might provide or might recommend.

-> There is an integrated device management system based on webserver applications delivered with our products. If you already have an own network management system you can easily integrate our devices in it as we are fully SNMP enabled.

We are looking forward to hearing from you

Regards

Bruno Zaugg
Business Development

CURRENT Technologies International GmbH

Gewerbepark
5506 Maegenwil
Switzerland

P +41 62 889 56 12

F +41 62 889 56 91

M +41 79 360 99 44

bruno.zaugg@currenttechnologies.com

Remark: We are pleased to announce that Ascom Powerline Communications AG and CURRENT Technologies are joining forces to capitalize on the untapped PLC business opportunity. Read more on www.ascom.com/powerline

Jose Andres Calle <joseandrescalle@yahoo.com>

An Bruno Zaugg <Bruno.Zaugg@ascom.ch>

23.02.2006 06:37

Kopie

Thema Information required from Empresa Eléctrica Quito S.A.

Dear Bruno Zaugg,

Thanks for your answer, we'll be waiting to receive the signed version of the CA.

We have to present the project before March 10 2006, which is our dead-line. We have tried to contact with your organization during the last weeks in order to get some information about the cost of your equipment, but it has been! quite hard to accomplish.

The main information we request is the cost of your equipment, the amount of them are based on an initial design based on the datasheets that you provide in your web page and on common characteristics of Broadband PLC technology, so we detail the equipment required hoping that you would give us a referential non-official price for them.

- For most of our home user in the trial area we request about 500 modems APC-2000-DA and 600 modems APA-2000-DB.
- For some corporate user and home user with special requirements we request 300 gateways API-2000-GW and 900 modems APC-2000-DA
- We request to work within 116 X-nodes, ! for which we need the cost of 116 API-2000-LV and 116 API-2000-MV.
- We are also interested in any management software for this network that your organization might provide or might recommend.

As long as we have a short time left to present the project we would appreciate a soon answer, so if it shortens the time needed for an answer there is not any inconvenient for us if the cost of the equipment is presented in Euros or if th! ey don't include the costs of importation to Ecuador.

Hopping to have a soon answer to this we subscribe,

Atte,

José Andrés Calle

Bruno Zaugg <Bruno.Zaugg@ascom.ch> escribió:

Dear Jose Andres

Thank you for your response. We received your documents end last week. Apologises for the late response that was basically caused by my obligatory military service absence. However we indeed are open to enter into a next phase and would appreciate to be informed about any required information you need from us.

You will get a signed version of the CA back within the next couple of days.

Best regards
Ascom PLC AG
Bruno Zaugg

ascom

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Powerline Lab Trial Kit

Explore triple play possibilities with Ascorm Powerline's 205 Mbps technology in your own laboratory. The Powerline Lab Trial Kit is custom designed for organisations that want to evaluate PLC technology for their applications. Whether you need PLC for data transmission or to setup VoIP networks or to deliver VoD services, this package allows you to explore all three application aspects at minimal overheads.



The kit is custom designed to walk you into the world of PLC. Start with an out-of-the-box, pre-configured environment and learn to customize it to your needs as you gain familiarity.

Verify PLC's triple-play capability without expensive external consultancy. The kit provides:

- Plug-and-play setup for streaming and analyzing data traffic
- Pre-configured VoIP infrastructure (Gatekeeper and devices) where you can simply plug in your analogue phones and make calls
- Detailed yet simple steps to setup your own PLC Video on Demand (VoD) environment.

In short, this kit provides easy transition from being a PLC novice to becoming a PLC expert.

Major advantages

For Marketing & Business Development

- Minimal initial investment for technology evaluation
- Extensive presentations on PLC technology and its capabilities
- Concrete suggestions on Market and Competence Development

For Engineering department

- Step by step walk through for first tests/experiments
- Detailed documentation to enable changes
- in configuration for additional tests
- Technology specific white-papers to help understand test-results.
- Includes evaluation Element Management System (EMS).
- All tools run off the CD. No need to install ANY software on your PC.

Kit contents

- 1x [APL-2000-GW](#) (Head-End mode)
- 1x [APL-2000-GW](#) (Repeater mode)
- 4x [APC-2000-VB](#) (Voice/Data CPE)
- 2x [APA-2000-DB](#) (Data Wallplug-Adapter)
- 1x Laboratory Coupling unit
- CD containing presentations, tutorials, tools and technology documentation
- 2 hours of technical [remote support](#) (e-mail or phone)
- Evaluation EMS

The Powerline Lab Trial Kit is available at an introductory price of 3'900 EUR only*

[Contact us](#) for purchasing your kit or getting further information about Ascorm Powerline Communications products and solutions.

* Price excl. VAT on a prepayment basis at least 5 days before shipment, delivery DDU within 2-4 weeks after purchase order. The [general terms](#) of Ascorm are valid.

PROFORMA MFA-5475

Quito, 5 de Julio del 2005

Cliente: Hypernet
Atención: Sr. José Andrés Calle
Referencia: Aire Acondicionado
Telf.: 099272660

La presente tiene por objeto poner a su consideración nuestra oferta por suministro e instalación de un sistema de acondicionamiento de aire para Centro de Cómputo y Cuarto de Equipos.

1. ALCANCE DE LA OFERTA

1.1 Centro de Cómputo

CANT	UNID	DETALLE	VALOR UNITARIO	VALOR TOTAL
EQUIPOS				
1	u	Equipo aire acondicionado tipo split consola piso techo Marca: LG Capacidad: 60,000 BTU/h Servicio eléctrico: 220 V, 60 Hz, 1Ph.	\$ 1,500.00	\$ 1,500.00
VALOR TOTAL EQUIPOS				\$ 1,500.00

INSTALACION				
1	gbl	kit de instalación que consta de tubería de cobre, aislamiento rubatex, base metálica, refrigerante, soldadura de plata y elementos de sujeción (para una distancia entre evaporadora y condensadora de 25 m), no incluye bomba de condensado.	\$ 310.00	\$ 310.00
1	gbl	Refrigerante R22 15 lb	\$ 48.00	\$ 48.00
1	u	Calibración de equipos y puesta en normal funcionamiento.	\$ 180.00	\$ 180.00
VALOR INSTALACION				\$ 538.00

VALOR TOTAL DE LA OFERTA				\$ 2,038.00
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Los precios no incluyen el 12% del IVA

1.2 Cuarto de Equipos

CANT	UNID	DETALLE	VALOR UNITARIO	VALOR TOTAL
EQUIPOS				
1	u	Equipo aire acondicionado tipo mini split Marca: LG Capacidad: 12,000 BTU/h Servicio eléctrico: 220 V, 60 Hz, 1Ph.	\$ 520.00	\$ 520.00
VALOR TOTAL EQUIPOS				\$ 520.00

INSTALACION				
1	gbl	kit de instalación que consta de tubería de cobre, aislamiento rubatex, base metálica, refrigerante, soldadura de plata y elementos de sujeción (para una distancia entre evaporadora y condensadora de 25 m), incluye bomba de condensado.	\$ 320.00	\$ 320.00
1	gbl	Refrigerante R22 15 lb	\$ 48.00	\$ 48.00
1	u	Calibración de equipos y puesta en normal funcionamiento.	\$ 160.00	\$ 160.00

VALOR INSTALACION	\$ 528.00
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VALOR TOTAL DE LA OFERTA	\$ 1,048.00
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Los precios no incluyen el 12% del IVA

1	Glob.	Transporte de materiales, equipos, herramientas, movilización de personal. Hospedaje y alimentación.	\$ 120.00	\$ 120.00
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2. LA OFERTA NO INCLUYE

- Trabajos de albañilería
- Material no especificado en la presente.
- Trabajos de acometidas eléctricas de fuerza

3. FORMA DE PAGO:

- A convenir

4. PLAZO DE ENTREGA:

- Equipos: Inmediata salvo venta previa
- Instalación: 3 - 4 días

5. VALIDEZ DE LA OFERTA:

30 días

6. GARANTIAS.

MEGAFRIO garantiza el normal funcionamiento de equipos, partes, piezas e instalación por un periodo de doce (12) meses bajo condiciones de buen uso y mantenimiento de los sistemas.

7. REPUESTOS.

MEGAFRIO está en capacidad de suministrar los repuestos y accesorios para el buen funcionamiento de los equipos en forma ágil, a precios de mercado a través de nuestros almacenes.

Esperando que esta oferta sea de su aceptación, cualquier duda o consulta, solicitamos nos hagan saber en el menor tiempo posible con el objeto de realizar cualquier aclaración de manera inmediata.

Atentamente,

Marcela Moreta
GERENTE COMERCIAL

Ing. Javier Cadena
DPTO. INGENIERIA



Pricelist Template

Effective August 1, 2005

Official Vendor Line-Item Price Submission Form

Product Line:	PACKETEER				
Awarded Vendor:	GOVERNMENT CHANNELS GROUP			Please refer to the Vendor's Ordering Instructions for details on Authorized Resellers	Awarded Vendor and any
Product Description:	BANDWIDTH ALLOCATION/MANAGEMENT APPLIANCES AND SOFTWARE				

Prices are listed for a quantity of 1. For volume discounts contact vendor for a quote or use Epylon's Spot Price Checker feature.

Buyers take note!

Fax Purchase Orders to 800-636-3779 or by using Epylon eCommerce at www.epylon.com. PEPPM bid protected orders can NOT be placed directly with a vendor.

Vendor SKU	Product Name	Product Description	Current Price	Unit of Measure	ManufacturerName	ManufacturerSKU
AV110-L000M-2000-CSP	AppVantage	AppVantage ASM 110, GIGe, monitor only, 2000 classes, Customer Support Program for 1 Yr.	\$ 4,700.50	1	Packeteer	AV110-L000M-2000-CSP
AV110-L000M-2000-CSPP	AppVantage	AppVantage ASM 110, GIGe, monitor only, 2000 classes, Premium Customer Support Program for 1 Yr.	\$ 5,630.00	1	Packeteer	AV110-L000M-2000-CSPP
AV110-L000M-2000-PSPP	AppVantage	AppVantage ASM 110, GIGe, monitor only, 2000 classes, Partner Support Program Plus for 1 Yr.	\$ 4,424.00	1	Packeteer	AV110-L000M-2000-PSPP
AV110-L000M-2000-PSS	AppVantage	AppVantage ASM 110, GIGe, monitor only, 2000 classes, Packeteer Software Subscription for 1 Yr.	\$ 3,318.00	1	Packeteer	AV110-L000M-2000-PSS
AV110-L000M-2000-PSSP	AppVantage	AppVantage ASM 110, GIGe, monitor only, 2000 classes, Premium Packeteer Software Subscription for 1 Yr.	\$ 4,147.50	1	Packeteer	AV110-L000M-2000-PSSP
AV110-L000M-2000-SX-CSP	AppVantage	AppVantage ASM 110, Fiber GIGe, monitor only, 2000 classes, Customer Support Program for 1 Yr.	\$ 4,700.50	1	Packeteer	AV110-L000M-2000-SX-CSP
AV110-L000M-2000-SX-CSPP	AppVantage	AppVantage ASM 110, Fiber GIGe, monitor only, 2000 classes, Premium Customer Support Program for 1 Yr.	\$ 5,630.00	1	Packeteer	AV110-L000M-2000-SX-CSPP
AV110-L000M-2000-SX-PSPP	AppVantage	AppVantage ASM 110, Fiber GIGe, monitor only, 2000 classes, Partner Support Program Plus for 1 Yr.	\$ 4,424.00	1	Packeteer	AV110-L000M-2000-SX-PSPP
AV110-L000M-2000-SX-PSS	AppVantage	AppVantage ASM 110, Fiber GIGe, monitor only, 2000 classes, Packeteer Software Subscription for 1 Yr.	\$ 3,318.00	1	Packeteer	AV110-L000M-2000-SX-PSS
AV110-L000M-2000-SX-PSSP	AppVantage	AppVantage ASM 110, Fiber GIGe, monitor only, 2000 classes, Premium Packeteer Software Subscription for 1 Yr.	\$ 4,147.50	1	Packeteer	AV110-L000M-2000-SX-PSSP
AV110-L200M-1000-CSP	AppVantage	AppVantage ASM 110, GIGe, up to 200Mbps shapng, 1000 classes, Customer Support Program for 1 Yr.	\$ 4,834.80	1	Packeteer	AV110-L200M-1000-CSP
AV110-L200M-1000-CSPP	AppVantage	AppVantage ASM 110, GIGe, up to 200Mbps shapng, 1000 classes, Premium Customer Support Program for 1 Yr.	\$ 5,688.00	1	Packeteer	AV110-L200M-1000-CSPP
AV110-L200M-1000-PSPP	AppVantage	AppVantage ASM 110, GIGe, up to 200Mbps shapng, 1000 classes, Partner Support Program Plus for 1 Yr.	\$ 4,650.40	1	Packeteer	AV110-L200M-1000-PSPP

Vendor SKU	Product Name	Product Description	Current Price	Unit of Measure	Manufacturer Name	Manufacturer SKU
PS10000-L000M-5000-SX-PSPP	PacketShaper	PacketShaper 10000/SFP, Fiber GigE, monitor only, 6000 partitions, Premium Packeteer Software Subscription for 1 Yr.	\$ 4,503.00	1	Packeteer	PS10000-L000M-5000-SX-PSPP
PS10000-L001G-2000	PacketShaper	PacketShaper 10000, Copper GigE, up to 1 Gbps shapng, 2000 classes	\$ 51,350.00	1	Packeteer	PS10000-L001G-2000
PS10000-L001G-2000-CSP	PacketShaper	PacketShaper 10000, Copper GigE, up to 1 Gbps shapng, 2000 classes, Customer Support Program for 1 Yr.	\$ 8,729.50	1	Packeteer	PS10000-L001G-2000-CSP
PS10000-L001G-2000-CSPP	PacketShaper	PacketShaper 10000, Copper GigE, up to 1 Gbps shapng, 2000 classes, Premium Customer Support Program for 1 Yr.	\$ 10,270.00	1	Packeteer	PS10000-L001G-2000-CSPP
PS10000-L001G-2000-PSPP	PacketShaper	PacketShaper 10000, Copper GigE, up to 1 Gbps shapng, 2000 classes, Partner Support Program Plus for 1 Yr.	\$ 8,216.00	1	Packeteer	PS10000-L001G-2000-PSPP
PS10000-L001G-2000-PSS	PacketShaper	PacketShaper 10000, Copper GigE, up to 1 Gbps shapng, 2000 classes, Packeteer Software Subscription for 1 Yr	\$ 6,162.00	1	Packeteer	PS10000-L001G-2000-PSS
PS10000-L001G-2000-PSPP	PacketShaper	PacketShaper 10000, Copper GigE, up to 1 Gbps shapng, 2000 classes, Premium Packeteer Software Subscription for 1 Yr.	\$ 7,702.50	1	Packeteer	PS10000-L001G-2000-PSPP
PS10000-L001G-2000-SX	PacketShaper	PacketShaper 10000, Fiber GigE SX w/LC connector, up to 1 Gbps shapng, 2000 classes	\$ 51,350.00	1	Packeteer	PS10000-L001G-2000-SX
PS10000-L001G-2000-SX-CSP	PacketShaper	PacketShaper 10000, Fiber GigE SX w/LC connector, up to 1 Gbps shapng, 2000 classes, Customer Support Program for 1 Yr.	\$ 8,729.50	1	Packeteer	PS10000-L001G-2000-SX-CSP
PS10000-L001G-2000-SX-CSPP	PacketShaper	PacketShaper 10000, Fiber GigE SX w/LC connector, up to 1 Gbps shapng, 2000 classes, Premium Customer Support Program for 1 Yr.	\$ 10,270.00	1	Packeteer	PS10000-L001G-2000-SX-CSPP
PS10000-L001G-2000-SX-PSPP	PacketShaper	PacketShaper 10000, Fiber GigE SX w/LC connector, up to 1 Gbps shapng, 2000 classes, Partner Support Program Plus for 1 Yr.	\$ 8,216.00	1	Packeteer	PS10000-L001G-2000-SX-PSPP
PS10000-L001G-2000-SX-PSS	PacketShaper	PacketShaper 10000, Fiber GigE SX w/LC connector, up to 1 Gbps shapng, 2000 classes, Packeteer Software Subscription for 1 Yr	\$ 6,162.00	1	Packeteer	PS10000-L001G-2000-SX-PSS
PS10000-L001G-2000-SX-PSPP	PacketShaper	PacketShaper 10000, Fiber GigE SX w/LC connector, up to 1 Gbps shapng, 2000 classes, Premium Packeteer Software Subscription for 1 Yr.	\$ 7,702.50	1	Packeteer	PS10000-L001G-2000-SX-PSPP
PS10000-L001G-2000-SX-XP	PacketShaper	PacketShaper 10000, Fiber GigE SFP, Xpress, up to 1 Gbps shapng, 2000 classes	\$ 59,250.00	1	Packeteer	PS10000-L001G-2000-SX-XP
PS10000-L001G-2000-SX-XP-CSP	PacketShaper	PacketShaper 10000, Fiber GigE SFP, Xpress, up to 1 Gbps shapng, 2000 classes, Customer Support Program for 1 Yr.	\$ 10,072.50	1	Packeteer	PS10000-L001G-2000-SX-XP-CSP
PS10000-L001G-2000-SX-XP-CSPP	PacketShaper	PacketShaper 10000, Fiber GigE SFP, Xpress, up to 1 Gbps shapng, 2000 classes, Premium Customer Support Program for 1 Yr.	\$ 11,850.00	1	Packeteer	PS10000-L001G-2000-SX-XP-CSPP
PS10000-L001G-2000-SX-XP-PSPP	PacketShaper	PacketShaper 10000, Fiber GigE SFP, Xpress, up to 1 Gbps shapng, 2000 classes, Partner Support Program Plus for 1 Yr.	\$ 9,480.00	1	Packeteer	PS10000-L001G-2000-SX-XP-PSPP
PS10000-L001G-2000-SX-XP-PSS	PacketShaper	PacketShaper 10000, Fiber GigE SFP, Xpress, up to 1 Gbps shapng, 2000 classes, Packeteer Software Subscription for 1 Yr	\$ 7,110.00	1	Packeteer	PS10000-L001G-2000-SX-XP-PSS
PS10000-L001G-2000-SX-XP-PSPP	PacketShaper	PacketShaper 10000, Fiber GigE SFP, Xpress, up to 1 Gbps shapng, 2000 classes, Premium Packeteer Software Subscription for 1 Yr.	\$ 8,887.50	1	Packeteer	PS10000-L001G-2000-SX-XP-PSPP
PS10000-L001G-2000-XP	PacketShaper	PacketShaper 10000, Copper GigE, Xpress, up to 1 Gbps shapng, 2000 classes	\$ 59,250.00	1	Packeteer	PS10000-L001G-2000-XP
PS10000-L001G-2000-XP-CSP	PacketShaper	PacketShaper 10000, Copper GigE, Xpress, up to 1 Gbps shapng, 2000 classes, Customer Support Program for 1 Yr.	\$ 10,072.50	1	Packeteer	PS10000-L001G-2000-XP-CSP
PS10000-L001G-2000-XP-CSPP	PacketShaper	PacketShaper 10000, Copper GigE, Xpress, up to 1 Gbps shapng, 2000 classes, Premium Customer Support Program for 1 Yr.	\$ 11,850.00	1	Packeteer	PS10000-L001G-2000-XP-CSPP

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By Part Number or Keyword

Your Source for Cisco PIX-535 (CiscoPIX-535)**Product: Used / Refurbished Cisco PIX-535 Firewall****Description: Used / Refurbished Cisco PIX-535 Firewall Chassis.**

The Cisco PIX-535 firewall is a high-performance purpose-built security appliance that delivers enterprise-class security for enterprise and service provider networks. The Cisco PIX 535 firewall modular three-rack-unit design supports up to ten 10/100 Fast Ethernet interfaces or nine Gigabit Ethernet interfaces and redundant power supplies making it an ideal appliance for businesses that need the highest levels of performance port density reliability and investment protection. It also delivers up to 1.7 Gbps of firewall throughput with the capability to handle more than 500000 simultaneous sessions. Certain PIX 535 firewall models include high-availability services as well as integrated hardware VPN acceleration that delivers up to 440 Mbps of Triple Data Encryption Standard (3DES) VPN throughput and 440 Mbps of Advanced Encryption Standard-256 (AES) VPN throughput.

Performance Summary

Cleartext throughput: Up to 1.7 Gbps
 Concurrent connections: 500000
 168-bit 3DES IPsec VPN throughput: Up to 425 Mbps with VAC+ or 100 Mbps with VAC
 128-bit AES IPsec VPN throughput: Up to 495 Mbps with VAC+
 256-bit AES IPsec VPN throughput: Up to 425 Mbps with VAC+
 Simultaneous VPN tunnels: 2000

Technical Specifications

Processor: 1-GHz Intel Pentium III Processor
 RAM: 512 or 1 GB of SDRAM
 Flash memory: 16 MB
 Cache: 256 KB level 2 at 1-GHz
 System buses: Two 64-bit 66 MHz PCI one 32-bit 33-MHz PCI

Network Liquidators is your premiere destination for buying and selling **Cisco PIX-535** at a great price. All of the Cisco PIX-535 come standard with our one year warranty (end-user customers only) and on most days can ship immediately. We also carry a large quantity of new, unused, preowned, and Cisco PIX-535 along with all Cisco cards, memory, and applicable accessories.

All of our Cisco PIX-535, new Cisco PIX-535, and preowned Cisco PIX-535 are guaranteed to be in perfect working and physical condition. We are also very interested in purchasing any of your Cisco

Product Info

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Condition: Refurbished

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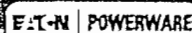
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ASESORA COMERCIAL


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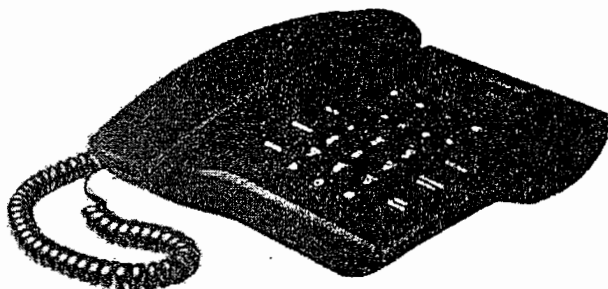
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Producto

Teléfono con identificador de llamadas FSK y listín para 99 llamadas entrantes y 99 llamadas salientes.

Características Técnicas

Dimensiones:	20 x 6 x 20,5 cm
Peso:	650 g
Interfaz:	a/b
Uso:	Líneas públicas y PABX
Flash:	90, 120, 270, 375 y 600 ms
Colores:	Darkblue y Arctic



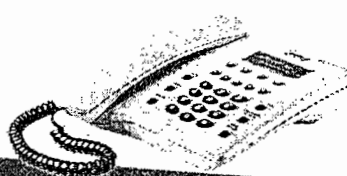
Características Principales

- ✓ Identificador de llamadas (Protocolo FSK)
- ✓ Listín de llamadas entrantes hasta 99 números y llamadas salientes hasta 99 números
- ✓ 10 memorias indirectas
- ✓ Bloqueo electrónico programable
- ✓ 6 teclas de acceso a servicios especiales del operador: llamada en espera, liberación de llamada, desvío directo, conferencia y llamada directa a la operadora.
- ✓ Display con backlight
- ✓ Modo de marcación por tonos o pulsos
- ✓ 3 niveles de volúmenes
- ✓ 3 melodías de timbre
- ✓ Retención con música en espera
- ✓ Baby - call
- ✓ Pausa
- ✓ Tecla de Re-marcaje
- ✓ 4 baterías tipo AA (no incluidas) o fuente de alimentación externa (no incluidas)

*Identificador de llamadas
Listín de llamadas
entrantes y salientes*



Darkblue



Arctic

euroset 3015

S

Producto

Teléfono con Función Manos Libres y agenda para 100 registros

Características Técnicas

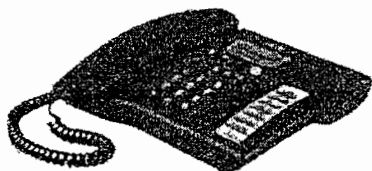
Dimensiones:	23 x 6 x 20,5 cm
Peso:	680g
Interfaz:	a/b
Aplicaciones:	Líneas públicas y PABX
Tecla flash:	90, 100, 250, 275 y 600 ms
Colores:	Light grey e Anthracite



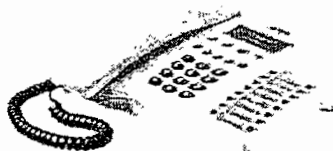
Características Principales

- ✓ Función Manos Libres con 6 ajustes de volúmenes
- ✓ Agenda para 100 registros (nombre/número)
- ✓ 3 melodías de timbre
- ✓ Bloqueo electrónico programable
- ✓ Bloqueo de recibimiento de llamadas a cobrar
- ✓ 16 memorias
- ✓ Modo de marcación por tonos o pulsos
- ✓ Retención con música en espera
- ✓ Re-marcaje del último número
- ✓ 6 volúmenes de recepción
- ✓ Display de cristal líquido y 3 intensidades de brillo
- ✓ Duración de llamada indicada en el display

*Función Manos Libres
Agenda para 99 registros*



Darkblue



Arctic

euroset

SIN TEXTO

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SEÑOR: EMPRESA ELECTRICA QUITO. (099272660)

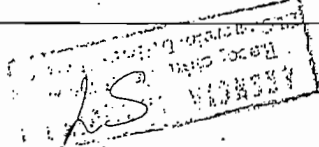
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ANEXO E
OPERA Technology White Paper



opera

Open PLC European Research Alliance

Work Package:

WP3

Type of document:

White Paper

Date:

01/02/06

IST Integrated Project No 507667

Public

Circulation:

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OPERA TECHNOLOGY WHITE PAPER

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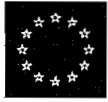
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GLOSSARY AND ACRONYMS

ACK	Acknowledgement
ADTTDM	Advanced Dynamic Time Division Multiplexing
AS	Access System
AV	Audio/Video
BPC	Bits Per Carrier
CPE	Customer Premises Equipment
CRC	Cyclic Redundancy Check
DAC	Digital to Analogue Conversion
DES	Data Encryption Standard
DHCP	Dynamic Host Configuration Protocol
EC	European Commission
EMC	Electro-Magnetic Compatibility
ETSI	European Telecommunications Standards Institute
FD	Frequency Division
FP6	Framework Program 6
HE	Head End
HURTO	High Ultra Reliable Transmission for OFDM
IFFT	Inverse Fast Fourier Transform
IHS	Inhome System
IQ	In-phase and Quadrature
IST	Information Society Technologies
LLC	Logical Link Control
LV	Low Voltage
MAC	Medium Access Control
MIB	Management Information Base
MV	Medium Voltage
NMS	Network Management System
OFDM	Orthogonal Frequency Division Multiplexing
OPERA	Open PLC European Research Alliance
OVLAN	Optimized VLAN
PDU	Protocol Data Unit
PHY	Physical Layer
PLC	Powerline Communication
PSD	Power Spectral Density
PSTN	Public Switch Telephone Network
QoS	Quality of Service
RADIUS	Remote Authentication Dial-In User Service
RFC	Request For Comments
RP	Repeater
SLA	Service Level Agreement
SNAP	SubNetwork Access Protocol
SNMP	Simple Network Management Protocol
SNR	Signal-to-Noise Ratio
TD	Time Division
VLAN	Virtual Local Area Network
VoIP	Voice over IP



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REFERENCES

[1] OPERA D59. OPERA Specification



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1 Executive Summary

The OPERA technology allows powerlines to be used to provide high performance internet connectivity. Following a two year effort and an outlay in excess of 20M€ by the European Union backed consortium, this is the first open Powerline specification, opening the doors for technology providers to build interoperable products.

This white paper provides an overview of the technology specifications defined by the OPERA Project [1], covering the main technical aspects of the OPERA specifications, including an explanation of the key areas of the PHY and MAC layer as well as descriptions of the higher layers.

2 About OPERA

OPERA is an initiative to foster the deployment of PLC by developing technology to allow powerlines to be used to provide high performance low cost broadband access service everywhere. OPERA has a budget of about 20 Million Euros, including a funding of 9 Million Euros from the European Commission in the framework of the FP6 call of the IST program.

The project provides a technology which enables electrical infrastructure to be adapted to provide competitive, HAM radio friendly PLC-based broadband services requiring low investment costs and minimum maintenance effort.

The OPERA project aims not only to provide a PLC standard but to share its vision of a world where operators and subscribers benefit from this revolutionary technology:

- Operators benefit from the availability of standard interoperable PLC equipment that allows the deployment of networks at low cost and the re-use of electricity network infrastructure.
- Subscribers benefit from a wider range of options for broadband access services especially where alternative technologies are not available.

The simplicity of network integration with different technologies and complete end-user coverage contribute to the deployment of these added-value services over broadband such as smart home, video streaming, e-health, telephony, tele-surveillance etc.



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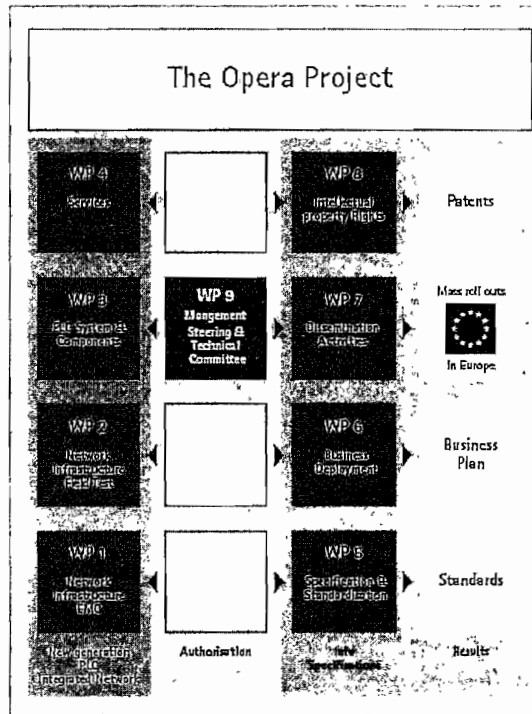
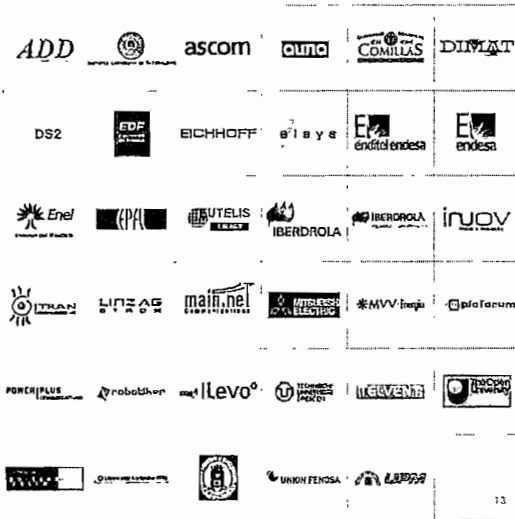


Figure 1 OPERA members and structure

2.1 OPERA Members and structure

The OPERA consortium involves the main stakeholders in PLC: electric utilities, equipment manufacturers, technology providers, universities, engineering consultancy companies and telecom operators.

All these partners have committed themselves to collaborate under the umbrella of the EC IST program and work together to achieve OPERA objectives.

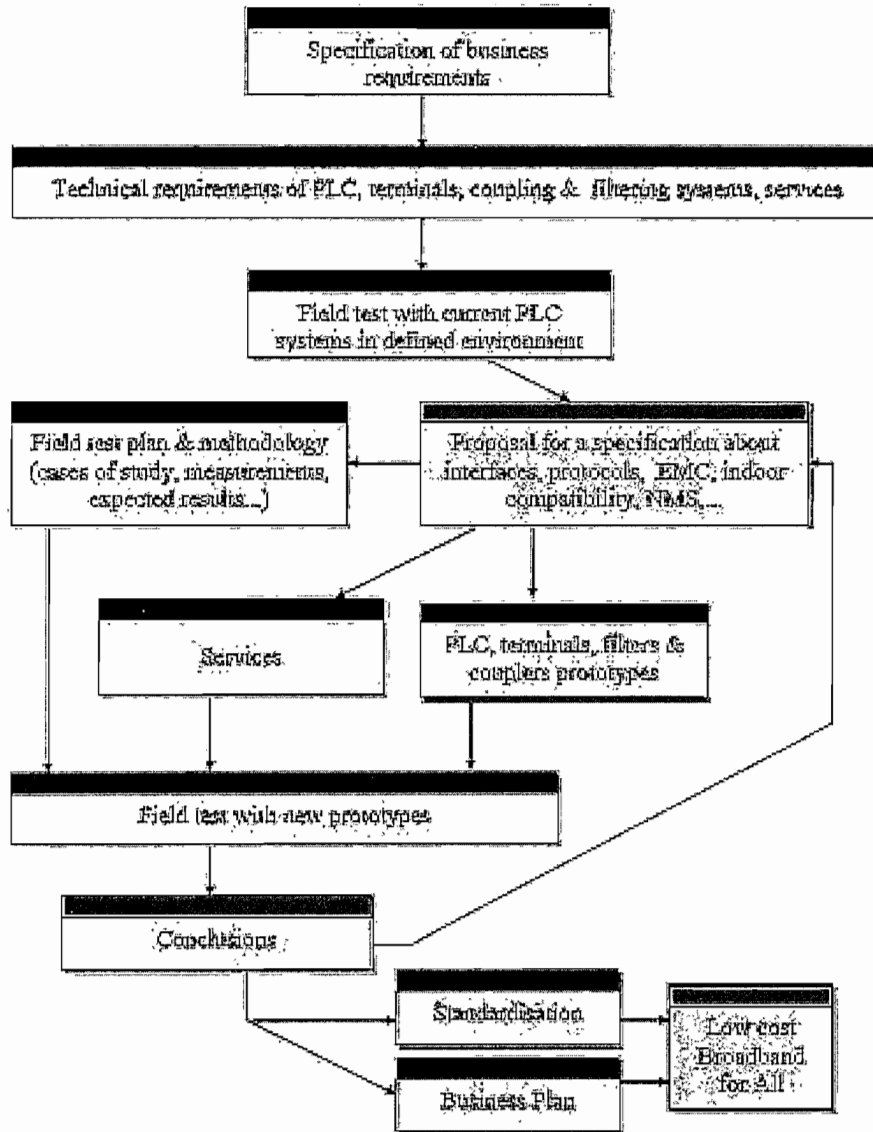


Figure 2 OPERA Project Overview

2.2 OPERA Time line

The OPERA project officially started its activities on January 1st 2004 (IST proposal/contract number 507667) and ran until the end of January 2006. Since the beginning a number of important milestones have been achieved:

- In November 2004, the OPERA Steering Committee endorsed a technology Selection Process based on the Marketing and Functional Requirement Document submitted by the Standardization Working Group of OPERA. This process led to the selection of a powerline communications technology to be used as baseline to develop and complete the OPERA Powerline Communications (PLC) solution. The baseline



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technology delivers speeds of more than 200 Mbps and is based on OFDM High Density modulation. It provides a high dynamic range (90 dBs) and offers Frequency Division and Time Division repeating capabilities.

- In August 2005, the field trials started, using prototypes from different equipment providers, which are compatible with the selected technology baseline. Four locations were selected to conduct the field/user trials: Ivrea, Italy (ENEL/WIND); Madrid, Spain (Iberdrola); Linz, Austria (Linz Strom); Lisbon, Portugal (EDP).
- An "OPERA Contribution to ETSI" indicating the main aspects of the technology, was submitted in September to the European standardization body ETSI.
- The OPERA Specification has been developed in the OPERA Specification Working Group, and has been approved on January 31st for its public release.

2.3 OPERA Key Features

The OPERA Specification has several features that make it advantageous to operators, related to powerline performance and network management as well as regulation matters:

- +200 Mbps OFDM modulation.
- Configurable frequency bands (width and spectral location).
- PHY spectral efficiency up to 8 bits/sec/Hz.
- Flexible PSD mask allowing frequency band notching dynamically and remotely controlled from the management centre, without any local intervention.
- A special robust mode to be reliable in the most difficult channels.
- Technology independent coexistence layer to allow coexistence between Access/In-house and future systems.
- 3DES encryption.
- Support for impulsive noise mitigation techniques.
- Time Division and Frequency Division repeaters can be used. The technology allows an unlimited number of repeaters to guarantee full coverage.
- QoS with 8 priority levels.
- Bandwidth control.
- Spatial Reuse Algorithm.

2.4 OPERA Deployment Model

The OPERA PLC network is composed of three types of PLC units:

- Head End Equipment (HE) which connects the PLC network to the backbone infrastructure.
- Repeater Equipment which is used to extend the coverage of the network.
- Customer Premises Equipment (CPE): connects the end user to a PLC access network.

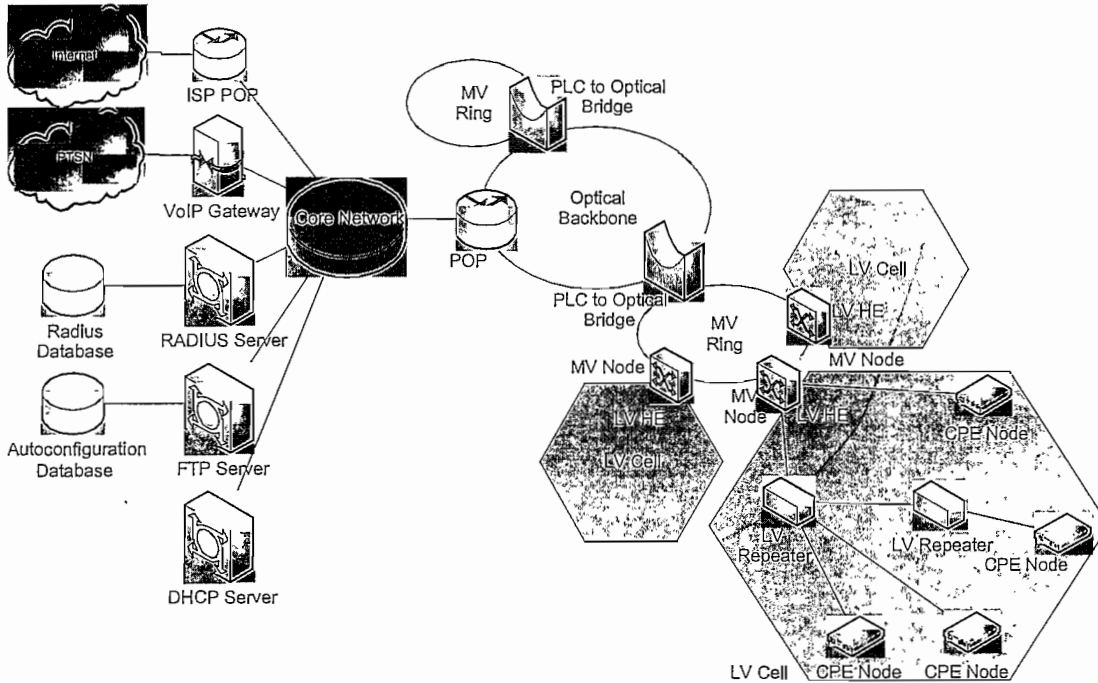


Figure 3 OPERA Powerline Access Topology

The OPERA Powerline Access Topology Model breaks the network down into a number of levels. Centrally, a core network provides core switching and management functions such as gateways to the Internet and PSTN, RADIUS authentication, DHCP services and Storage of network configuration data. To provide very wide area networking links, an optical fiber network is used to connect to remote medium-to-low voltage transformer sub-stations. As low cost alternative to optical fiber, the data link can be channeled onto medium voltage (MV) power-lines allowing the connection of all the sub-stations.

The electricity network which spans from each medium-to-low voltage transformer to the electricity users fed by those transformers is known as a LV cell. The PLC connectivity within a LV cell is provided in a tree topology, with a Head End (HE) which usually connects the LV cell to the medium voltage network. Customer Premises Equipment (CPE's) may be connected directly to the HE or through a series of Repeaters (RP). Repeaters increase the range of the PLC signal by retransmitting the signal that they receive either at a different frequency to the signal that they receive (Frequency Division) or in different time slots (Time Division).



3 The OPERA Specification

3.1 Layered Reference Model

The OPERA specification uses a Layered Reference Model to describe the different levels of its protocol stack. The Layers are defined as:

- PHY Layer defines the physical data transmission format on the medium
- MAC Layer defines how different nodes are allocated transmission opportunities
- LLC Layer handles packets segmentation and grouping and defines how error free communication is achieved between nodes
- Convergence Layer defines how standard protocols such as 802.3 Ethernet are mapped to the OPERA protocol and how the data encapsulation is made.
- Layer Management defines how each of the layers is configured and adapted to changing network conditions.

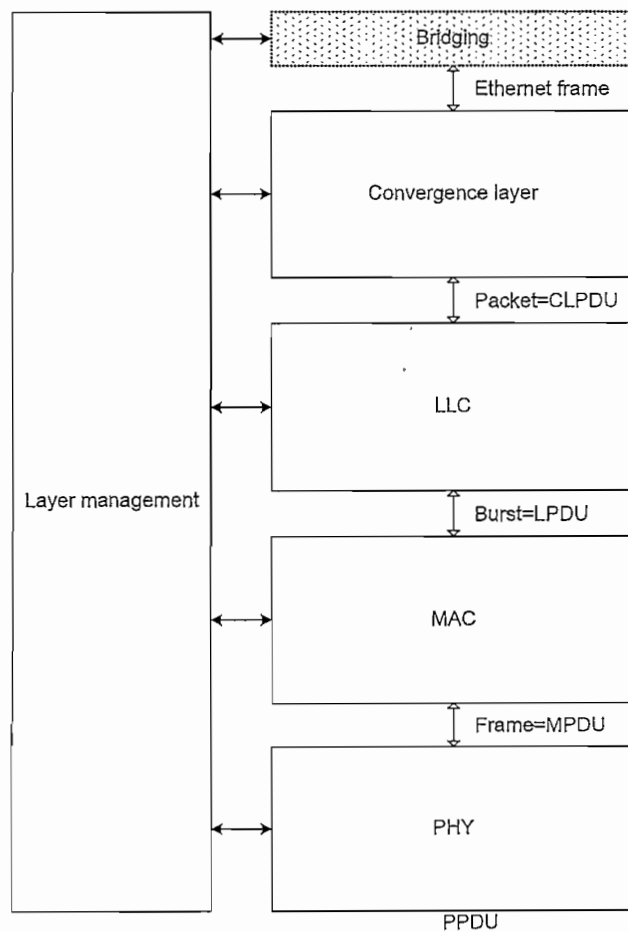


Figure 4 OPERA Layered Reference Model



In addition to these layers, mechanisms are provided for Encryption and Coexistence.

3.2 OPERA Transmission Format

3.2.1 Frame Format

There are two main types of frames: Regular frames and Channel estimation frames. Regular frames are used to carry data between nodes, and are terminated by a token. Regular frames contain as payload PLC bursts which may be addressed to different destinations in the same frame in order to maximize efficiency. Depending on the type of token, they can be classified in six different types:

- *Data frames* contain a token that gives access to the channel to other node.
- *Silence frames* are similar to data frames but the token is retained by the transmitting node.
- *Polling frames* are used by Head End and Repeater nodes to update the state of the connections. Periodically, Idle nodes are polled to check if they have data pending for transmission and can be added to the Active node list. Upon reception of a polling frame, a node responds with a short (much shorter than the data symbol) unmodulated signal if the node has data to send. Idle nodes do not receive tokens, therefore not wasting channel resources.
- *Access frames* are used by Head End and Repeater nodes to invite new nodes to join to the powerline network. Upon reception of an access frame, new nodes contend for access to the channel using a back-off algorithm. After contention is won, both nodes (the Head End or Repeater that sent the Access frame and the new node joining the network) initiate the connection (setting up QoS parameters, negotiation of modulation parameters, etc).
- *Access Reply frames* are sent as response to Access frames.
- Non-returnable Data frame are used to give access to the channel to several nodes simultaneously, thus providing spatial reuse. The Spatial Reuse capability increases greatly the performance of the network maximizing the aggregate capacity of the whole PLC cell.

Channel estimation frames are sent periodically by every node so that communicating nodes can estimate their channel and adjust the number of bits per carrier suited for that channel.

3.2.2 Burst Format

Each regular frame is made up of a series of Bursts, which contain data transmissions between individual logical links in the system. Within each burst, a burst header indicates the logical link identifying the receiving and transmitting nodes, followed by the payload data formatted as a series of codewords.

3.2.3 Codeword Format

Codewords are transmission sequences consisting of a pure data payload followed by a number of bits of redundancy. The codewords are not necessarily word matched with the



underlying symbol transmission, determined by the parameters managed by the PHY Layer Protocol.

3.3 Physical Layer

The Physical (PHY) Layer is based on Orthogonal Frequency Division Multiplexing (OFDM). OFDM has been chosen as the modulation technique because of its inherent adaptability in the presence of frequency selective channels, its resilience to jammer signals, its robustness to impulsive noise and its capacity of achieving high spectral efficiencies.

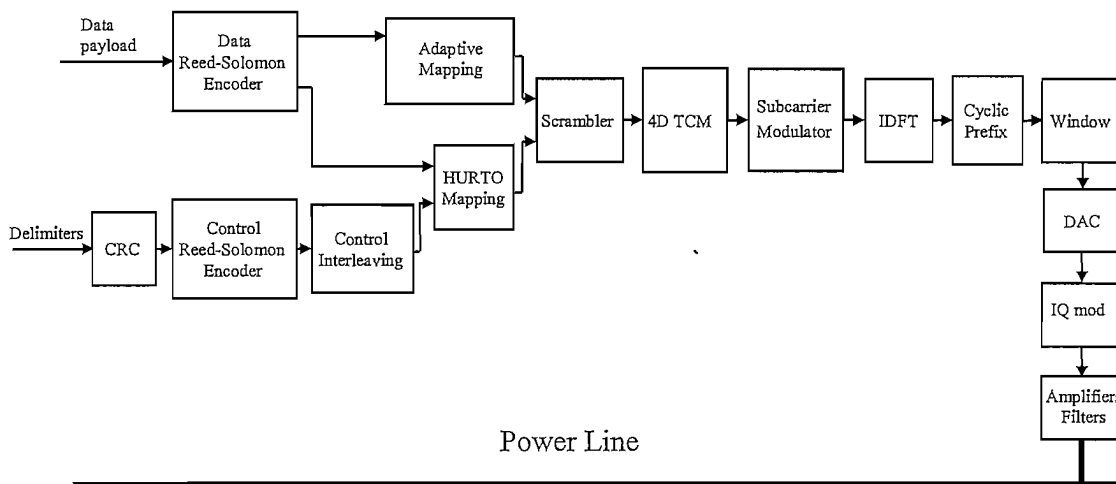


Figure 5 Transmission PHY layer

Concatenation of four-dimensional Trellis Coded Modulation and Reed-Solomon forward error correction, specially tuned to cope with the very special powerline channel impairments, assures high performance in the worst cases.

3.3.1 Bandwidth Capabilities

Most of the features that allow +200 Mbps data transmission reside in the PHY layer. The OPERA PHY features configurable frequency bands, with bandwidths of 10, 20 or 30 MHz.

This bandwidth flexibility has been included in the system in order to support Frequency-Division (FD) repeating capability and coexistence mechanisms.

In its 30 MHz mode, OPERA systems provide a maximum physical throughput of 204.94 Mbps.

3.3.2 Adaptive Bit Loading

Modulation parameters for each pair of transmitter/receiver are adapted in real-time depending on channel quality parameters for each subcarrier. Figure 6 depicts an example of this functionality. The Signal-to-Noise Ratio (SNR, in black color) is measured for each subcarrier and the optimum modulation (BPC, in blue color) is chosen, with the objective of achieving the maximum transmission speed while maintaining the desired Bit Error Rate (BER).

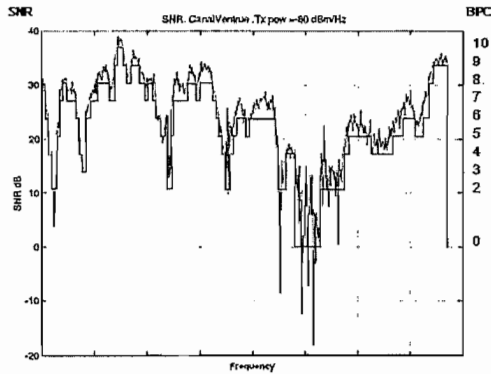


Figure 6 Sample "Signal-to-Noise Ratio" (SNR) and bit loading map for a sample powerline channel

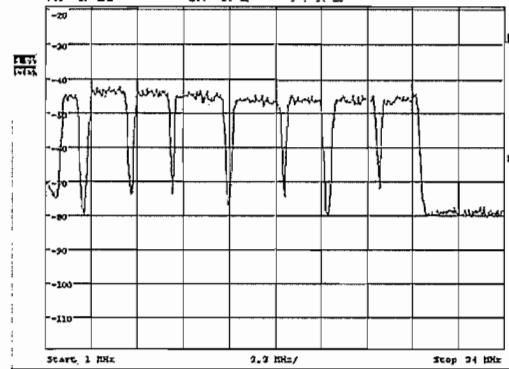


Figure 7 Example of a Power Spectral Mask with arbitrary notches

3.3.3 Notching Capabilities

Broadband powerline employs frequencies that in some geographical areas may be licensed to different radio services, such as amateur radio bands. Legal regulation in different countries may impose limitations on which frequencies can be used by powerline communications and which frequencies must be avoided (exclusion bands). Regulations are typically country-specific, so powerline communications products may be forced to use different frequencies depending on the country where they are used.

Spectral notching is a technique commonly used for avoiding exclusion bands. Notches are created by turning off those OFDM sub-carriers that fall in the exclusion bands, thus eliminating the energy transmitted in those bands.

OPERA uses windowed-OFDM modulation that allows programmable notches with a depth of up to 30 dBs, with a negligible loss of performance.

OPERA technology allows device manufacturers to create customized notches configuration for each country, without requiring any hardware changes at all.

Figure 7 shows an example of the type of arbitrary Power Spectral Mask that can be achieved with OPERA system.

Additionally, in the case of a change in regulation, products that are already deployed in the field can be easily upgraded in order to guarantee compliance, avoiding costly product replacements.

3.3.4 The OPERA OFDM Symbol

The OFDM symbol uses 1536 sub carriers, with modulation densities from 2 to 10 bits per sub carrier applied independently to each of the sub carriers. The reason for choosing this high number of sub carriers is two-fold:

- Achieving high accuracy when estimating channel Signal-to-Noise Ratio and adapting the modulation of each subcarrier accordingly.
- Achieving very narrow notches, with small impact in neighbor sub carriers.



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3.3.5 Forward Error Correction

The PHY layer provides two different levels of reliability.

- The most reliable mode is known as HURTO mode, reserved to information that is critical for the correct operation of the system, such as burst headers and control information. In order to achieve such a high reliability, special Forward Error Correction, interleaving and frequency redundancy (depicted in Figure 5 as HURTO mapping) is used, jointly with a very robust modulation, to assure the correct demodulation in the reception side, even in the worst channel conditions.
- Normal data information can be transmitted using adaptive mapping to tightly match the channel characteristics, obtaining the highest possible throughput for each case. This adaptation includes not only the bits per carrier that can be used for a given desired bit error rate, but also a dynamic Reed-Solomon configuration for each of the transmitted bursts, depending on the channel state.

Once the OFDM symbol has been constructed, a truncated four-dimensional Trellis Coded modulation is performed, increasing the reliability of the transmitted signal.

3.3.6 Symbol Transmission

After each subcarrier has been independently modulated, the whole frequency-domain signal is processed by an IFFT block. After this block, the cyclic prefix is added, and the transmission window is applied.

The final blocks represent the IQ modulation (that allows placing the transmission band at different frequencies), the Analog Front End, and the coupling unit to inject the final OFDM signal into the powerline channel.

3.4 Medium Access Control (MAC) Layer

3.4.1 Advanced Dynamic Time Division

OPERA technology uses an Advanced Dynamic Time Division Multiplexing (ADTDM) MAC which is optimized for Audio/Video distribution scenarios, where high performance, stringent bandwidth reservation, strict traffic prioritization and QoS are a must. The ADTDM MAC provides collision-free access to the channel to all the nodes in the powerline network according to different service priorities, which can be adjusted to suit different types of applications, ranging from data, VoIP, Video on demand, etc.

OPERA implementation of ADTDM combines dedicated, random, and under-demand channel sharing mechanisms under a distributed hierarchical access protocol. The arbitration of the channel access is controlled by a centralized entity in the network in a way that adapts to the different topology possibilities, ensuring that all transmissions are compliant with the defined QoS profile.

3.4.2 MAC Network Entities

At the MAC level, any OPERA device can play one the following roles:

- **Head End:** Head End devices control the access to the channel of the other devices, and make sure that resources are allocated in a way that satisfies QoS requirements. Head Ends are responsible for generating the channel "token" and distributing this token to the rest of devices in the network.



- Repeater: a repeater is a device that receives the token from the Head End and forwards it to other devices that are out of reach of the Head End.
- CPE: Customer Premises Equipment is a device that is not a Head End or a Repeater.

3.4.3 Channel Arbitration and Tokens

OPERA uses a dynamic MAC mechanism which has several advantages:

- Collisions are completely avoided, removing a source of uncertainty in the latency of the transmissions.
- The Head End has control over how much time each node owns the channel.
- There is a deterministic upper bound on how much time it will take for a given node to gain access to the channel (bounded channel access latency), which is critical for AV applications.
- No bandwidth is wasted if a given node does not have any data to transmit, as channel control can be returned immediately to the Head End.

In the following pages the 3 cases of usage of the MAC are shown:

Figure 8 shows a network with "complete visibility" (Nodes A, B and C can communicate directly). Figure 9 shows a network with "incomplete visibility". Whilst nodes A and B can communicate directly, as can nodes B and C, the attenuation between A and C is such that communication between these nodes is only possible by node B repeating the signal

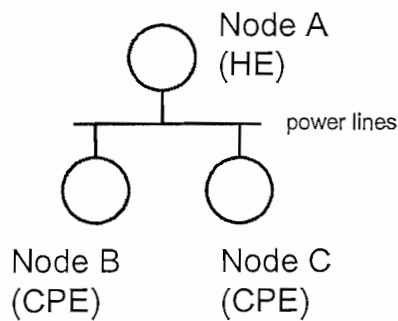


Figure 8 Sample network with complete visibility

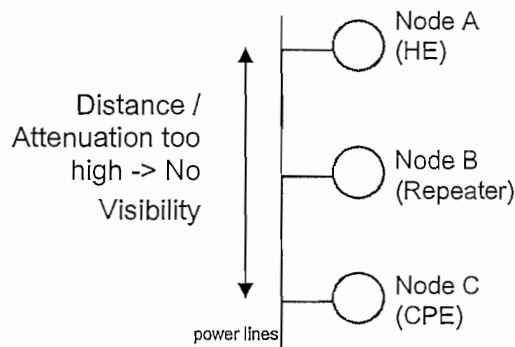


Figure 9 Sample network with incomplete visibility (Node A and Node C cannot communicate directly)

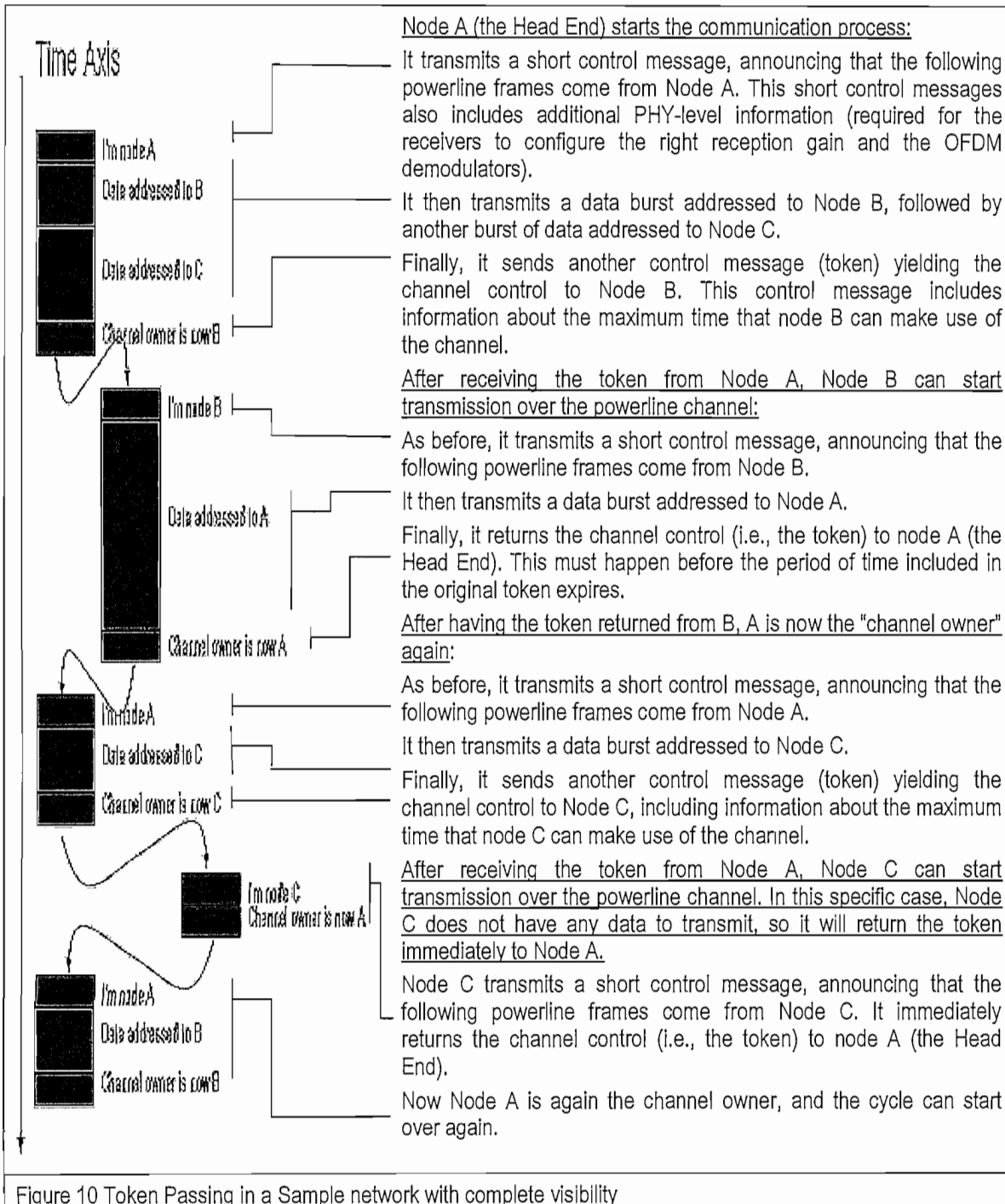


Figure 10 Token Passing in a Sample network with complete visibility

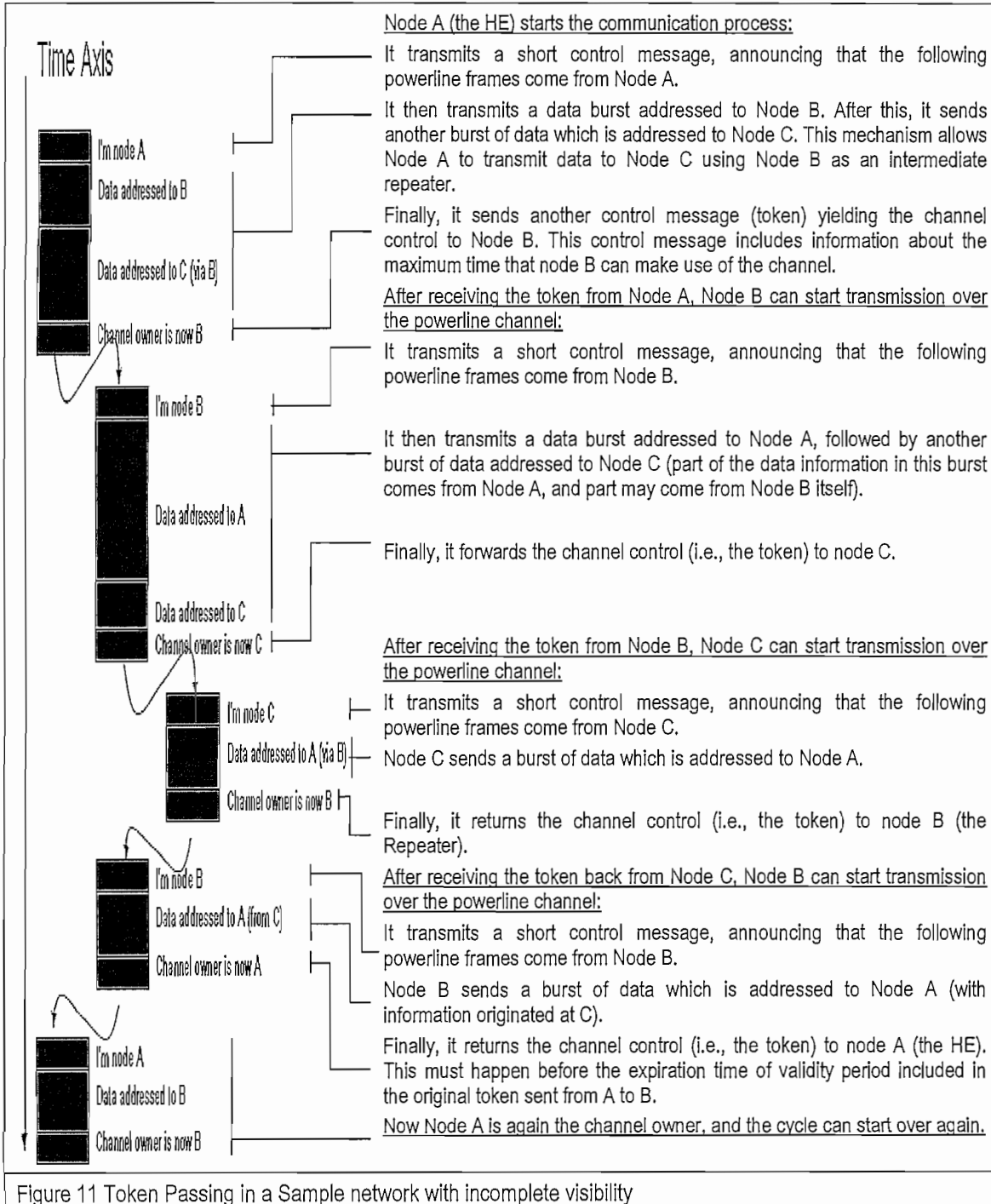


Figure 11 Token Passing in a Sample network with incomplete visibility



3.4.4 MAC Auxiliary Mechanisms

The MAC protocol includes a whole set of auxiliary mechanisms to guarantee the correct operation of the protocol:

- Sub-protocol for handling new nodes joining the network.
- Sub-protocol for automatic discovery of the network topology, allowing nodes with incomplete visibility to communicate with other nodes out their reach, making use of intermediate repeaters.
- Sub-protocol for learning which hosts/devices are reachable via each powerline device, based on an 802.1d learning model.
- Sub-protocol for handling nodes being disconnected from the network.
- Sub-protocol for token recovery in case of having one node disconnected while it was the channel owner.

3.5 Link Layer Control (LLC) Layer

The LLC Layer in OPERA ensures the error free transmission of data, between pairs of PLC nodes. This is done in transmission by encoding the Data Payload provided by the Convergence Layer into sequences of Codewords. These Codeword Sequences, called Bursts, are transmitted between node pairs using an optional Acknowledgement scheme.

3.5.1 Burst structure

A burst is composed of a Burst Header delimiter followed by a data payload including one or several fragmented and/or completed packets. A Burst Header delimiter without any following data payload is used to send ACK when there are no data to be sent.

Figure 12 shows how the mapping/encapsulation of an Ethernet 802.3 frame is performed in OPERA, in the case that a packet has to be fragmented in several bursts.

1. The packet is split to fill the payload sections of the codewords, to which Reed-Solomon redundancy data will be added.
2. A header is added to each codeword that carries information required for later merging all codewords together into the original Ethernet frame.
3. Groups of codewords are concatenated into a burst.

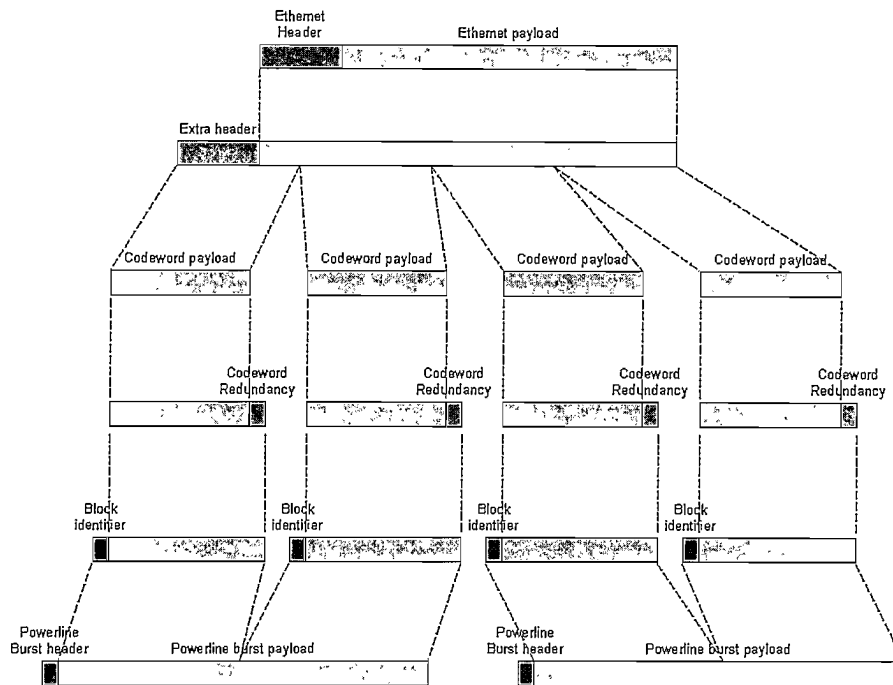


Figure 12 Generic Mapping of an Ethernet frame into PLC-level bursts

3.5.2 Burst Acknowledgement Scheme

OPERA uses a “Sliding window” protocol for managing reliable end-to-end transmission of data frames. Each burst has a “burst identification number”. During normal system operation, the receiver sends an acknowledgement (ACK) of the last “burst identification number” correctly received.

Figure 13 shows how the ACK protocol works:

1. First, the “left node” transmits a series of bursts (with identification numbers 1, 2 and 3) to the “right node”. The “left node” keeps those bursts in the transmission buffer, in case that they need to be retransmitted.
2. Due to channel noise, burst #3 is corrupted. Only bursts 1 and 2 are correctly received.
3. Next, the “right node” sends a control message to the “left node”, acknowledging that the last successfully received burst was burst #2.
4. Next, the “left node” removes bursts #1 and #2 from the transmission buffer and retransmits burst #3.
5. This time, burst #3 is correctly received, so the “right node” sends a new control message acknowledging that burst #3 has been correctly received.
6. After receiving the ACK, the “left node” removes burst #3 from the transmission buffer.

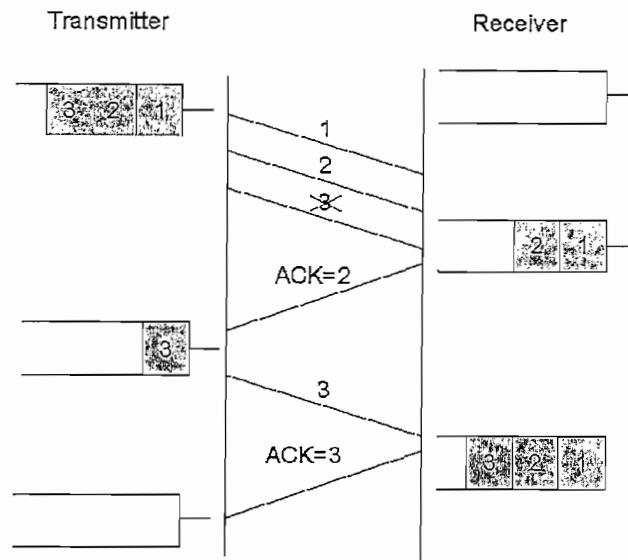


Figure 13 Burst Acknowledgement Scheme

This ACK protocol provides several advantages:

- A group of several bursts can be sent to a given node, without waiting for each specific burst to be acknowledged. This allows for longer transmission frames, which increases efficiency.
- Packet Losses at the powerline level are hidden from the application layer, which only perceives an "Ethernet-like" zero-loss channel.

3.6 Convergence Layer

The Function of the Convergence Layer is to encapsulate packets coming from external applications (typically 802.3 Ethernet frames) before passing them to the LLC for transmission.

The Ethernet frame is encapsulated into a powerline packet, which is basically formed by the original Ethernet frame plus a powerline header that includes information such as powerline-level priority, OVLAN (an extension of VLAN), broadcast control information, etc.

3.6.1 Virtual LAN Management

Virtual LAN (VLAN) management allows an OPERA network to be separated into different independent isolated sub-networks that can be managed independently.

In addition, the standard 802.1q VLAN, is extended with additional OVLAN tagging capabilities, providing an additional tagging field which can be used independently of the standard 802.1q VLAN tags.



3.7 Layer Management

3.7.1 Control protocols

OPERA defines a specific format for exchanging control information between nodes that uses SNAP encapsulation in regular Ethernet frames. The main control protocols are:

- Adaptive bit-loading protocol: used to exchange bit-loading tables to adapt the transmission characteristics to the channel.
- Access protocol: used to accept new nodes in the network
- Port solver protocol: used to exchange addressing information between nodes.
- Cluster discovery protocol: used to discover nodes that can transmit simultaneously without interfering with each other, so that spatial reuse can be achieved.
- Connection admission protocol: to reserve resources for data flows.
- Protocol for automatic management of crosstalks between not synchronized systems: used when two independent networks interfere each other.

3.7.2 Spanning Tree Protocols

Spanning Tree protocols are fully configurable by the operator, including the improved Rapid Spanning Tree algorithm specially developed and optimized to match powerline networks topology particularities. This advanced algorithm takes into account not only the structure at network level, but also PHY layer parameter to obtain the best networks paths in the network.

3.8 Quality of Service (QoS)

Many applications for the transmission of data, video, and audio have specific requirements in bandwidth, latency, jitter, and packet loss. The MAC layer with QoS support contains the required functionality to comply with the different services, and to conform to the Service Level Agreement(s) (SLA) of each customer.

The main objective of the QoS provided by the MAC layer is therefore to guarantee a given bandwidth and latency to different flows, depending on the how the available service classes are configured and on the type of traffic being transmitted.

There are eight service classes available (which will be referred to as SLA), which are mapped to three different types of resource reservation policies (Best effort, CBR and VBR) and four different maximum latencies. The incoming traffic goes through a module called the Traffic Classifier, whose job is to prioritize packets based on some simple rules. OPERA based systems provide up to eight different priorities, which are mapped to the already mentioned eight SLAs.

SLA	PRIORITY	RESOURCE RESERVATION	LATENCY (MS)
7	7	Best effort	80
6	6	CBR	10
5	5	VBR	20
4	4	VBR	40



SLA	PRIORITY	RESOURCE RESERVATION	LATENCY (MS)
3	3	VBR	40
2	2	VBR	40
1	1	Best effort	80
0	0	Best effort	80

Table 1 SLA Configuration table example

Upon acceptance of a new node, the QoS parameters that specify the services available to that user node are downloaded through the auto-configuration protocol. The set of parameters that can be configured in every user are:

- *Maximum Throughput:* Maximum throughput available to a user for the best effort traffic.
- *Allowed SLAs:* Set of SLAs allowed for that CPE.

The QoS of OPERA based systems provide the following features in order to guarantee the differentiated services to every connected user:

- Packet Classification
- Latency Management
- Call Admission Control
- Bandwidth Control
- Service Differentiation
- Excess Bandwidth Management
- User Profiles

3.8.1.1 Packet Classification

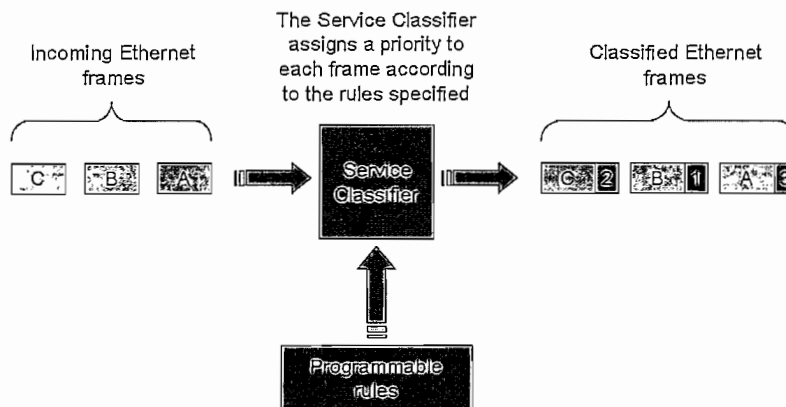


Figure 14 Service Classifier module

In order to handle different services and applications adequately, OPERA devices need to identify the class of service that each specific Ethernet frame belongs to. Although the way to do this is implementation-specific, the recommended mechanism is using a "Service Classifier" module. The Service Classifier module is responsible for determining the SLA



level of each frame according to a set of rules established by the device manufacturer, the service provider or the end-user.

Figure 14 shows how the Service Classifier entity works:

- Incoming frames are inspected, one by one, looking for patterns that the Service Classifier can use for determining SLAs.
- Once the SLA has been determined, a “tag” is added to the frame, so that it can later be identified by other entities of the OPERA specification (for example, for management of prioritized buffers).
- The set of programmable rules are typically of the following type: If the byte in offset AA of the Ethernet frame is BB, then the SLA of the packet is CC.

Typical default rules for the Service Classifier could be: decide SLAs according to bits in 802.1p or 802.1q field, or according to bits in IPv4 TOS field, etc. Incoming Ethernet data can be classified in eight different classes depending on some programmable rules based on the contents of the packet.

3.8.1.2 Latency Management

Infrastructure nodes detect the transmitted and received SLAs so that the scheduling mechanism is adapted to the type of traffic and to the specified SLAs. Thus, a node transmitting high priority traffic will receive better service than a node transmitting low priority traffic.

3.8.1.3 Bandwidth Control

Bandwidth control ensures that every node’s throughput is the specified value at all times. The scheduler also maintains the obtained throughput to the specified value, although sometimes it is not possible due to insufficient channel quality. Bandwidth control is performed on the transmitter side in order to maximize the efficiency of the system.

3.8.1.4 Service Differentiation

Any user may transmit several flows with different SLAs simultaneously. The scheduler ensures that the most demanding traffic will meet the SLA constraints. If there is unused bandwidth, lower priority traffic will be piggybacked in the same high-priority connection. Otherwise, excess traffic will be dropped.

3.8.1.5 Excess Bandwidth Management

Due to sudden changes in the channel conditions, it may happen that the agreed performance cannot be attained. OPERA based systems have the required embedded mechanisms to automatically degrade the lower priority services in order to maintain the quality of high priority services until the channel quality is enough to support all connections again.

3.8.1.6 User Profiles

To define the QoS profile of different connections in the PLC network, OPERA uses the concept of User Profiles, which are special files to specify the characteristics of the connections in terms of parameters such as maximum transmission and reception bandwidths, allowed types of SLAs and specification of the SLAs.

User Profiles are stored in a central server and are downloaded by the infrastructure equipment whenever a new user enters into the network through the auto-configuration process described in more detail later in this document.



3.9 Security Mechanisms

OPERA specification includes a powerful security structure based on 168-bit triple DES encryption that guarantees the privacy of each communication between nodes. In fact, a specific key can be selected for each communication link that a node can perform, increasing dramatically the data exchange protection. In addition to that, each data frame can be encrypted using time varying subkeys that change each few microseconds, making more difficult the action of possible unwanted observers.

The encryption key distribution uses the well-know asymmetric Diffie-Hellman key agreement, using a pair of public and private keys that are generated locally by each node using special method to assure the enough randomization of the seed. By means of this algorithm, common encryption key can be negotiated without compromising its knowledge.

Authentication of each node is performed by the use of a RADIUS server, that includes the MAC address list of allowed nodes to be connected in certain network, and that also tells if encryption in the links established in the network must be set.

3.10 Coexistence Mechanisms

The OPERA coexistence mechanism is based on the Coexistence Specification of the Universal Powerline Association.

It is based on the transmission/detection of two unmodulated OFDM signals. OPERA defines three sharing mechanisms among coexisting networks, based on pure FD, pure TD and hybrid FD/TD.

The basic coexistence mechanism between Access Systems (AS) and Inhome Systems (IHS) consists in FD sharing. AS work in the lower frequency band while IHS operate in the upper frequency band. If there are several in-home systems, these systems will share the upper frequency band using TD.

The way the channel is shared among contending networks is by using a common coexistence frame (see Figure 15).

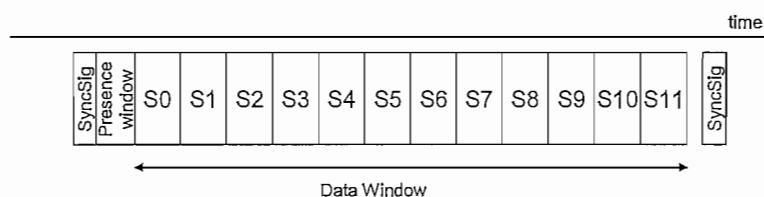


Figure 15 OPERA Coexistence Frame

The frame is divided in three different parts:

1. **Synchronization Signal.** Every node shall transmit a coexistence signal (SyncSig) at a fixed rate in such a way that all nodes transmit it simultaneously. The purpose of the SyncSig signal is to ensure that all nodes are synchronized in time, and are able to use the coexistence frame in the same way.
2. **Presence Window.** The presence window is used to signal the existence of different systems and to reserve the upcoming data slots.
3. **Data Window.** The data window is used in case of TD sharing. It is the time where individual networks transmit data. It is composed by 12 fixed size data slots. These



slots are assigned to different networks depending on the selected scheduling mechanism. Scheduling mechanisms can be devised in order to maximize different rules such as traffic priority, number of users or other different parameter.

3.11 Autoconfiguration and provisioning

Most important configurable features of the system can be easily configured through a unique and consistent configuration layer that provides the tools to match utility target network structure and expected performance.

This feature allows a complete automation of the deployment of the PLC network: medium voltage equipment, low voltage HE, repeaters and CPEs. All the parameters that need to be set to provision new equipment in a PLC network (QoS, VLAN, VoIP parameters...) can be configured remotely by means of configuration files and DHCP requests. Therefore, no pre-configuration of the modem is required prior to installation; only the MAC address of the node need to be known. The profile of every node is provisioned in a central server and different management VLANs can be present in different sections of the network. Besides, this configuration procedure allows as well the existence of multiple data and VoIP VLANs across the network, being able to support a wholesale model with multiple service operators.

If a node has permanent storage memory, the remote configuration can be downloaded and stored to be retrieved locally the next time the modem boots.

This autoconfiguration feature has a built-in authentication process to accept or reject nodes trying to connect to the Access network. If the node is accepted, a profile (QoS and VLAN settings) is assigned to it informing the master with the type of service the new node must receive. This authentication can be performed in three different ways:

- No authentication: All nodes will be accepted and a default profile is assigned.
- RADIUS authentication: The HE of the network queries the RADIUS server if the new detected node is allowed to connect to the network. If the node is accepted, the RADIUS server informs the HE the assigned profile.
- Authorization list authentication: In this configuration the RADIUS server is not used. The master holds a list of allowed nodes with their profiles.

Authentication allows the operators to control the access to the network.

The autoconfiguration allows policies to be set for each of the traffic types present in the network, as well as the dynamic control of the bandwidth and latency for each user.

In networks where Voice over IP (VoIP) is implemented, parameters like dial plan, gatekeeper configuration, regional specific configurations, activation of standard or specific codecs such G711, G729 and others can be fully configured.

In order to make easier the configuration, several user profiles that include sets of VLAN, OVLAN, QoS, VoIP, Spanning Tree parameters are possible. In this way, the network configuration becomes easy and at the same time with total control of each of the nodes in the managed network.



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3.12 MIB / SNMP

OPERA equipment supports SNMP (Simple Network Management Protocol). The SNMP agent supports all the standard SNMP messages (*GetRequest*, *GetNextRequest*, *SetRequest*, *GetResponse* and *Trap*), providing a powerful management tool:

- *Get* operations allow monitoring the status of the network nodes, retrieving the current node configuration, and collecting statistics.
- *Set* operations allow a wide range of management actions including the full configuration of the node by an SNMP manager.
- *Traps* are sent by the agent to inform the manager about relevant events, so it can act consequently.

Supporting all these operations allows reaching a trade-off between a pure active management (where SNMP managers are in charge of contacting periodically the agents to control their state) and a pure trap-directed polling (where each agent is responsible of notifying the management station any unusual event).

OPERA SNMP agents maintain up to three MIBs (Management Information Bases) that are compliant with RFC 1155, which specifies the general framework in which a MIB can be defined and constructed:

- MIB-II: The standard management information base approved by the IAB and defined in RFC 1213. This MIB defines all the managed objects that should be present in the nodes of any communication system.
- OPERA MIB: Provides status, configuration and statistics that are particular to PLC systems and the OPERA technology.
- OPERA VoIP MIB: Provides the VoIP status, configuration and statistics for the VoIP-enabled nodes.



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