

# **Operation and administration of services based on the ADSL access network**

**04-05-2006**

**By Ole Krog Thomsen**

**TDC**

# ADSL practical application

- **How to install ADSL**
- **What is the reach and the bandwidth**
- **Which equipment to use**
- **Equipment at exchanges**
- **Configuration**
- **ADSL connections**
- **Debugging**

# Contact information

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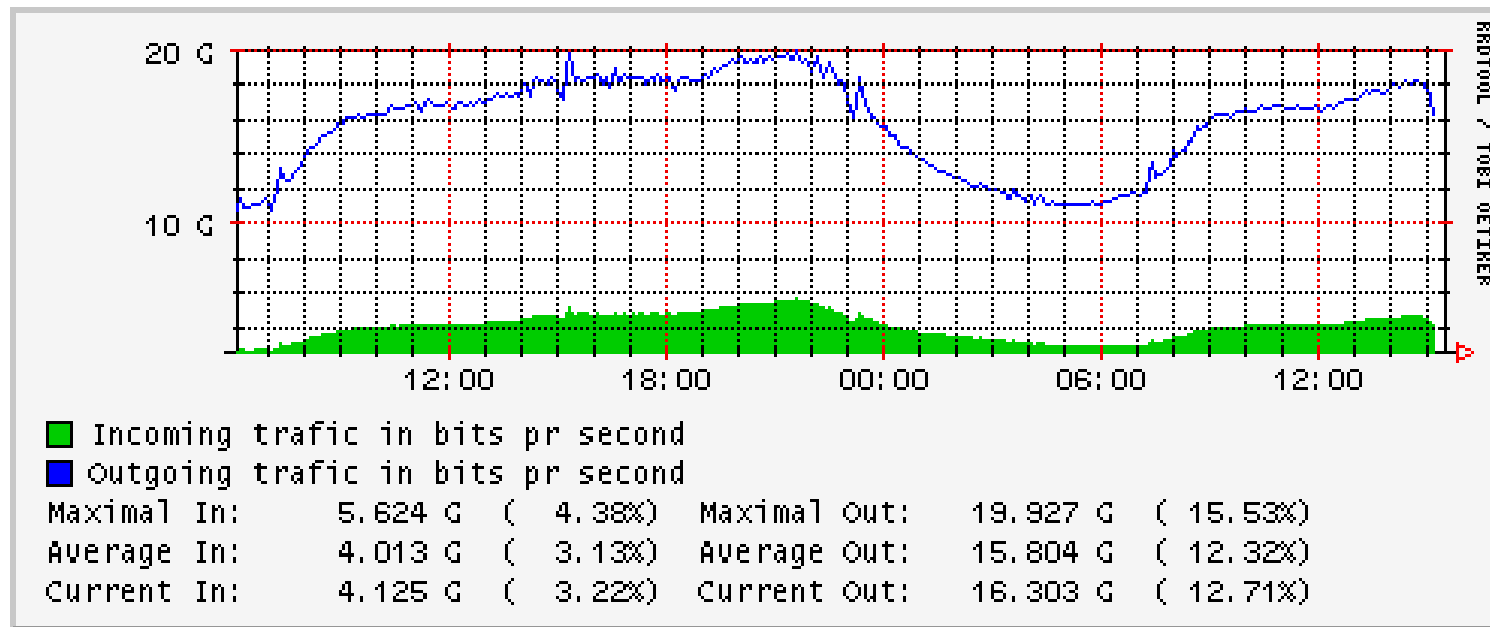
Mobile: +45 23 38 11 80

E-Mail: [okt@tdc.dk](mailto:okt@tdc.dk)

[okt@control.aau.dk](mailto:okt@control.aau.dk)

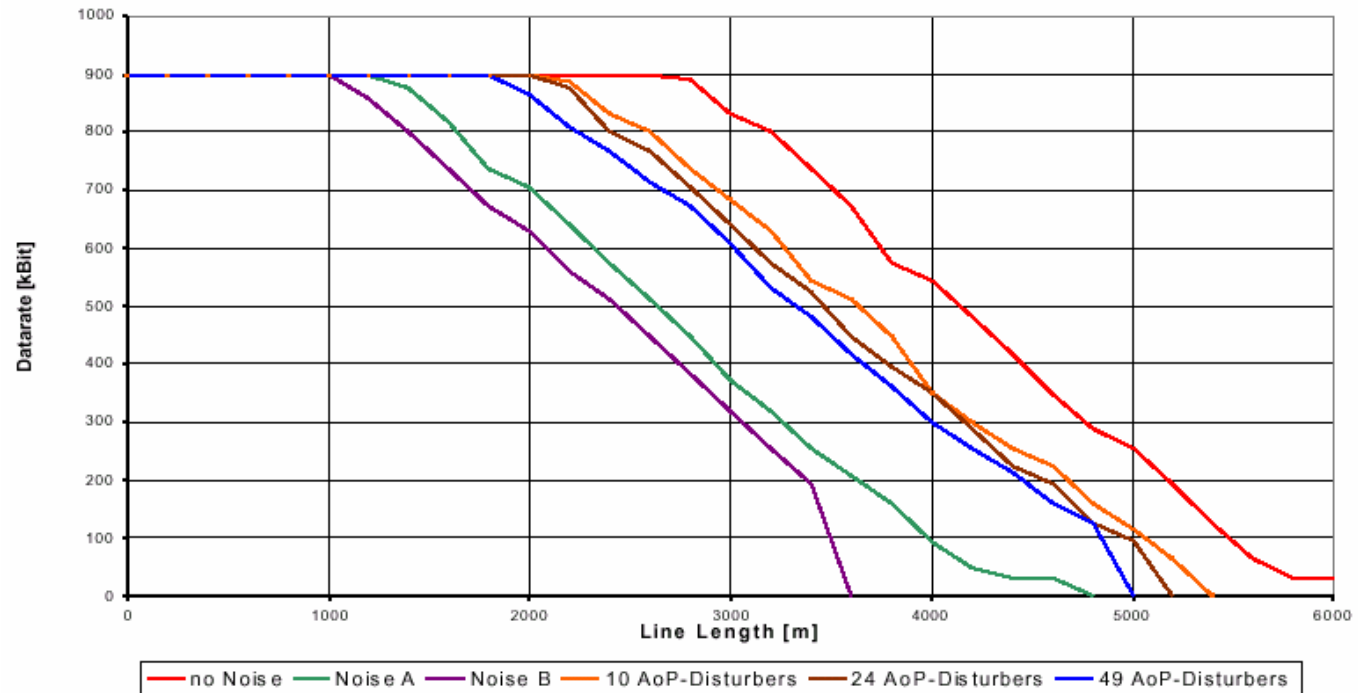
<http://www.control.aau.dk/~okt>

# ADSL traffic



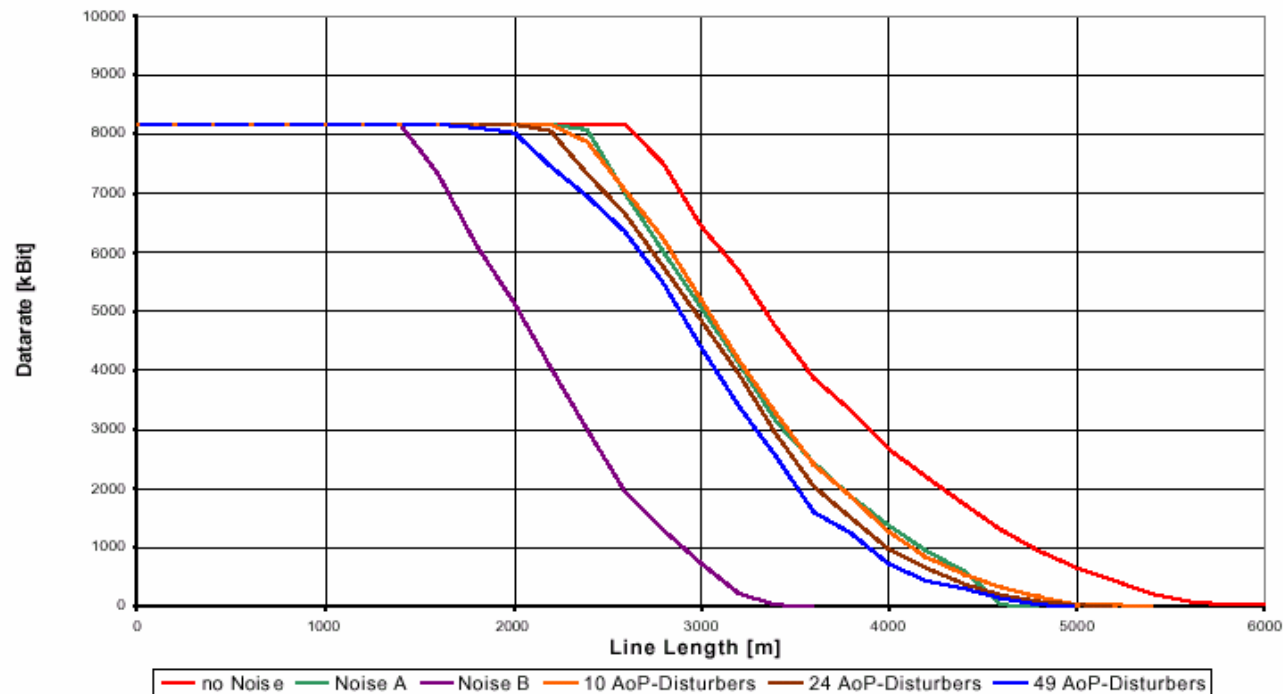
# Reach of ETSI cables

## ADSL over POTS upstream performance

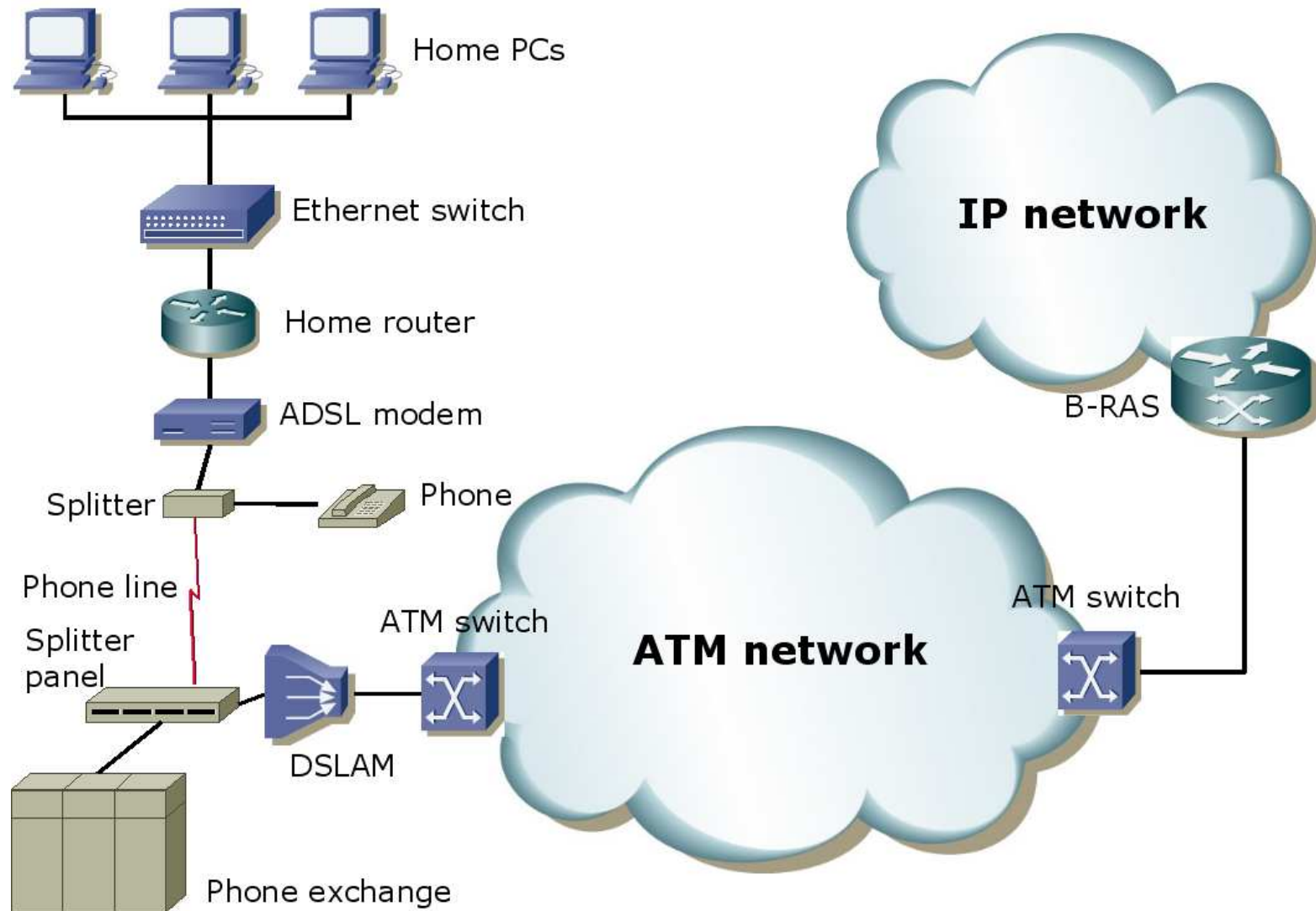


# Reach of ETSI cables

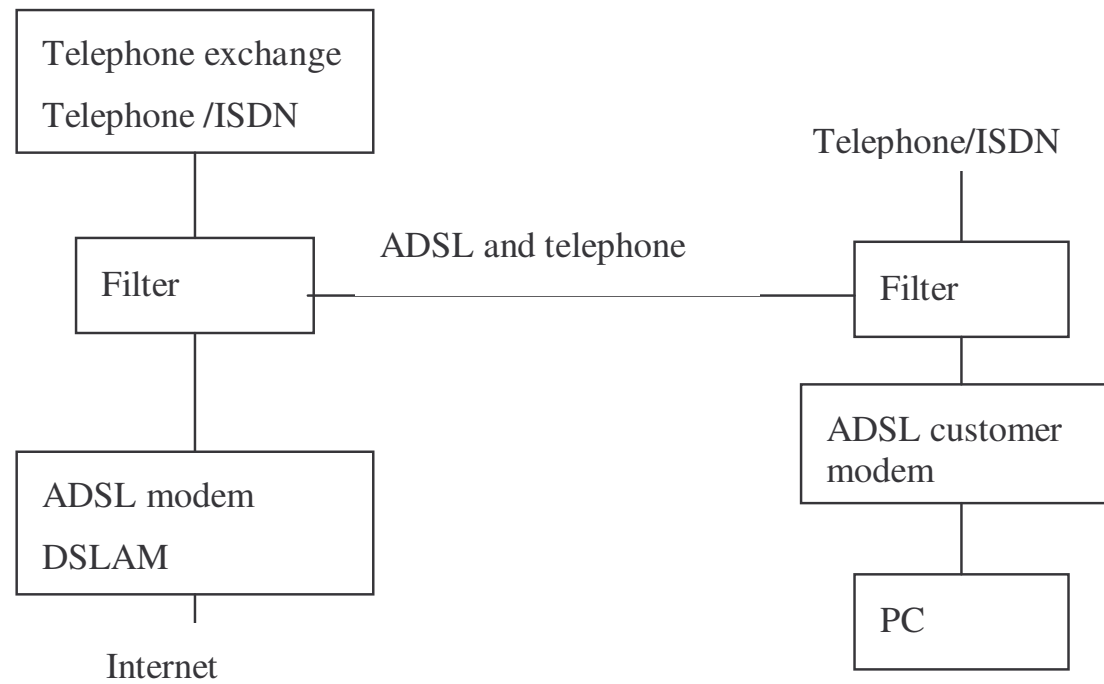
## ADSL over POTS downstream performance



# ADSL configuration

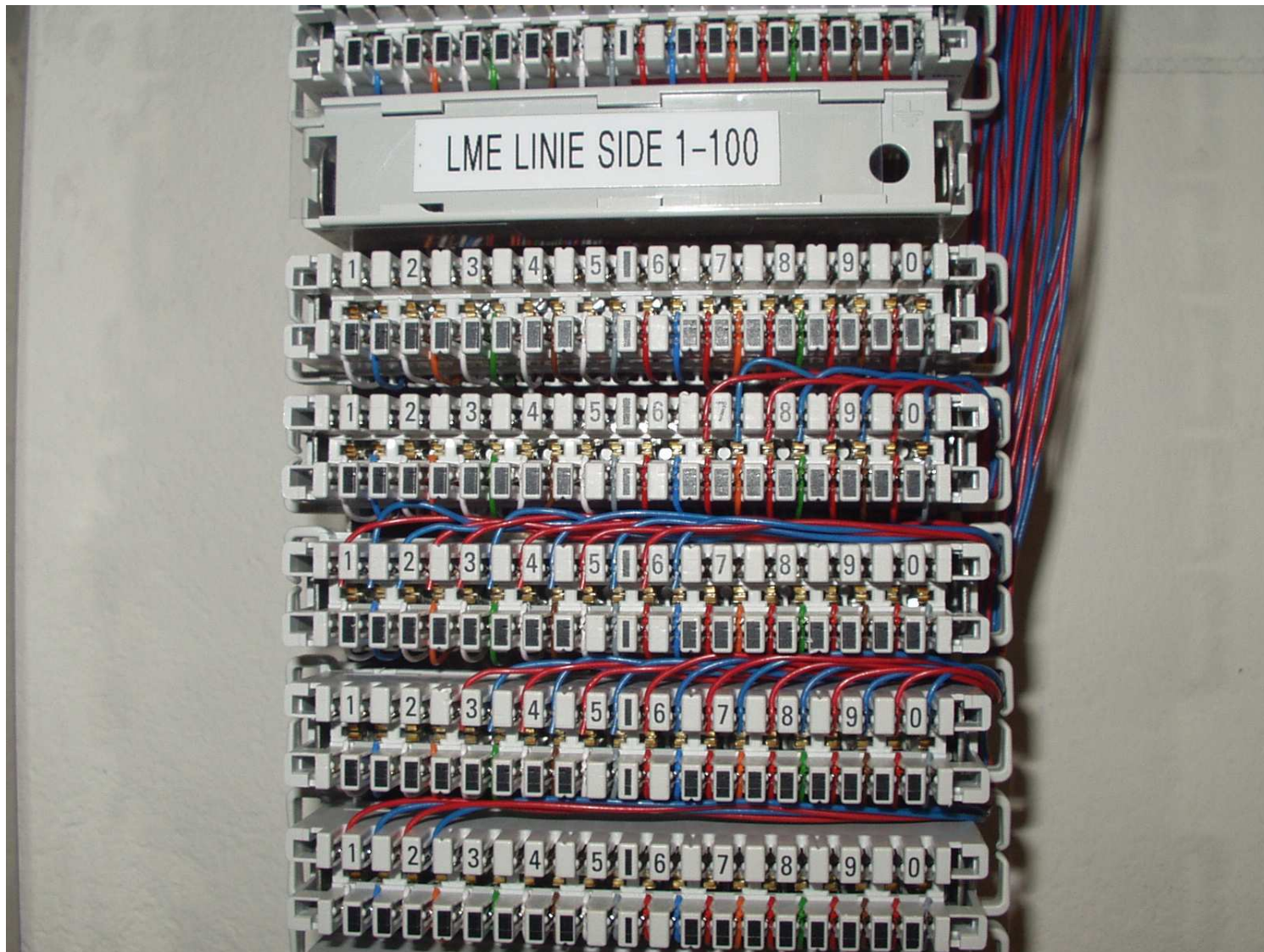


# ADSL installation





## Breakout panel

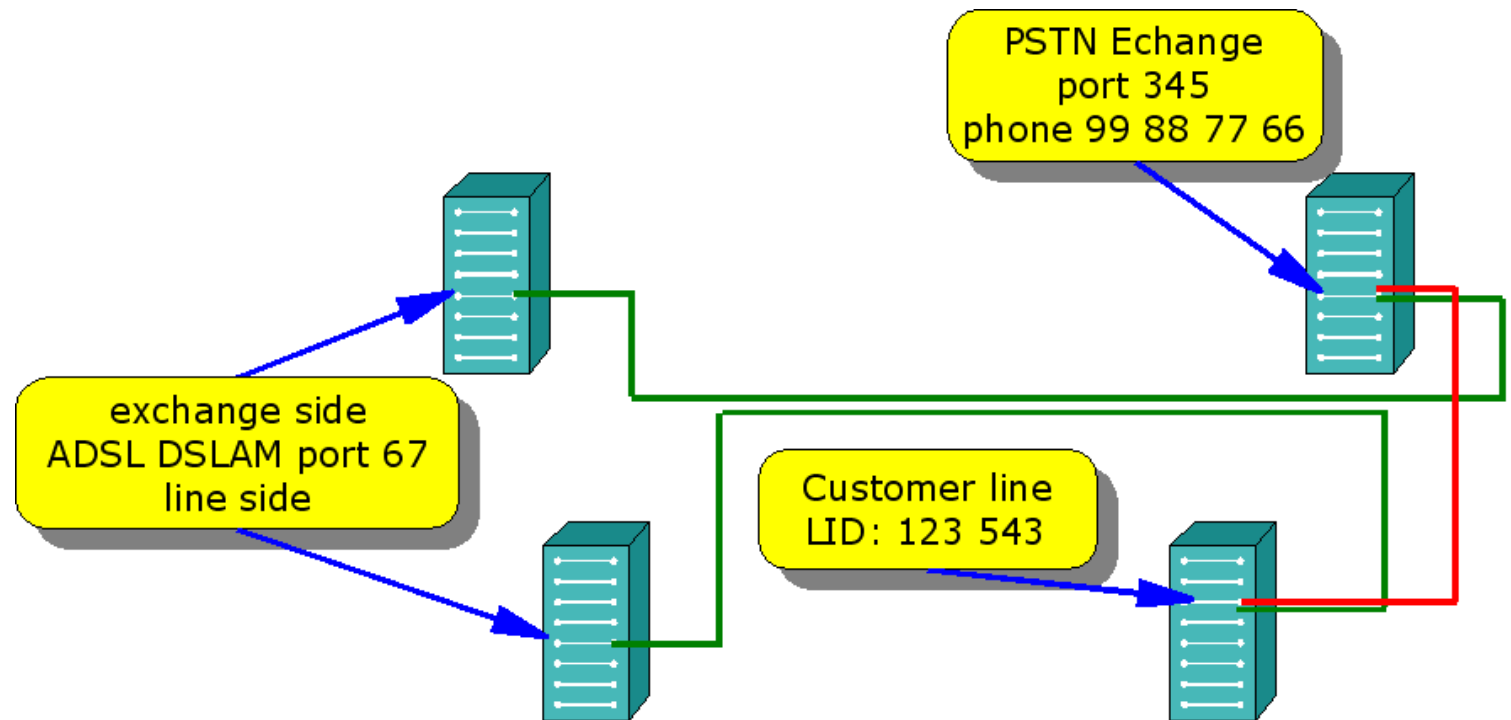


# LSA Pliers



# DSL connection setup

- The red line is disconnected, and the 2 green are connected
- The two leftmost breakout boxes are backwired to the splitter connected to port 67 on the DSLAM



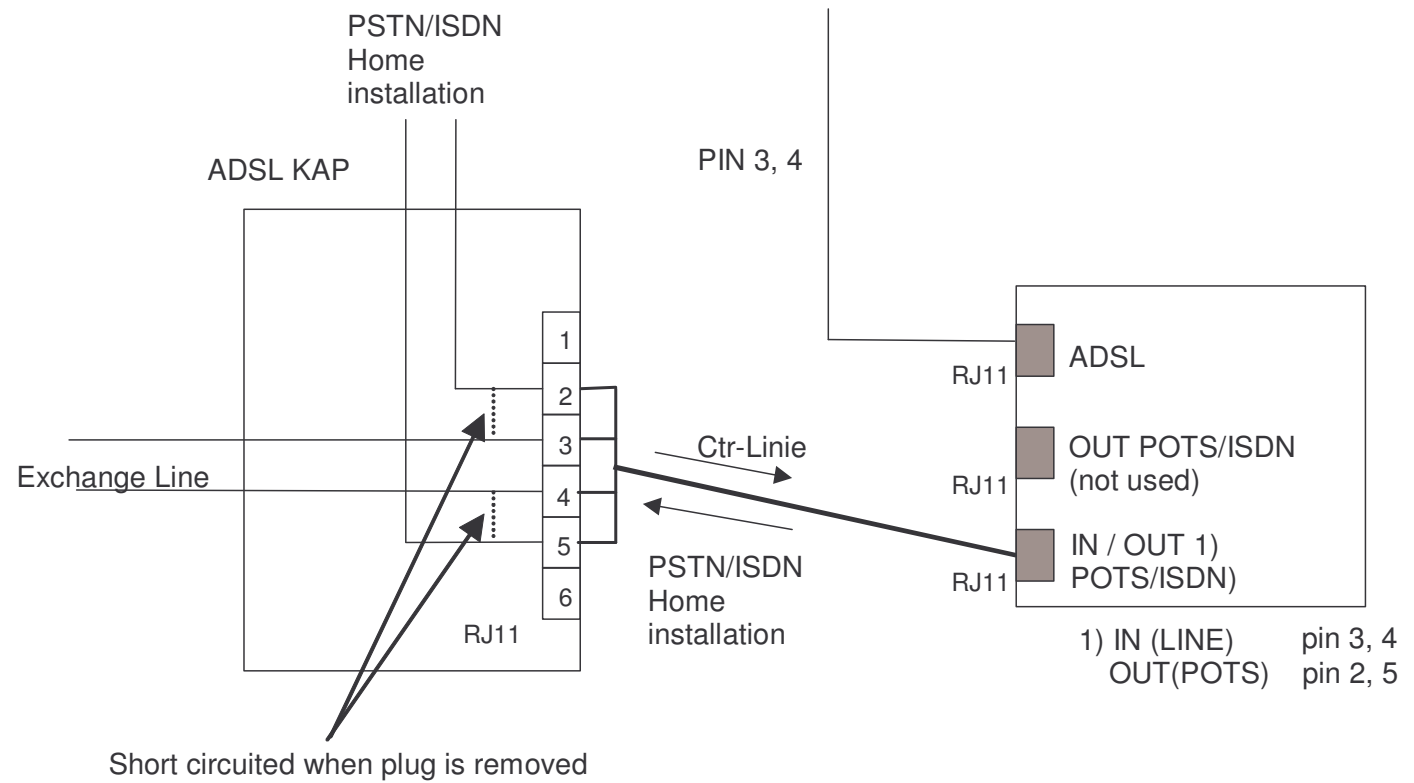
# Line qualification

ADSL									
Computed attenuation dB:		Max. attenuation at 150kHz [db]				Accept without calculation			
Up kbit/s	Down kbit/s	PSTN		ISDN		PSTN	ISDN	PSTN	ISDN
128	128	42 dB	OK	27 dB	OK	3,5 km	2,2 km	250 nF	160 nF
	256								
	512	40 dB	OK	3,3 km	238 nF				
	2048								
256	256	40 dB	OK	24 dB	OK	3,3 km	2,0 km	238 nF	143 nF
	512								
	1024								
	2048								
512	512	32 dB	OK	16 dB	OK	2,6 km	1,3 km	190 nF	95 nF
	1024								
	2048								
768	4096	18 dB	OK	9 dB	OK	1,5 km	0,7 km	107 nF	53 nF
512 (min 128)	512 (min 512)	42 dB	OK	27 dB	OK	3,5 km	2,2 km	250 nF	160 nF
	2048 (min 512)								
768 (min 256)	4096 (min 2048)	40 dB	OK	24 dB	OK	3,3 km	2,0 km	238 nF	143 nF
768 (min 512)	8096 (min 4096)	28 dB	OK	16 dB	OK	2,3 km	1,3 km	166 nF	95 nF

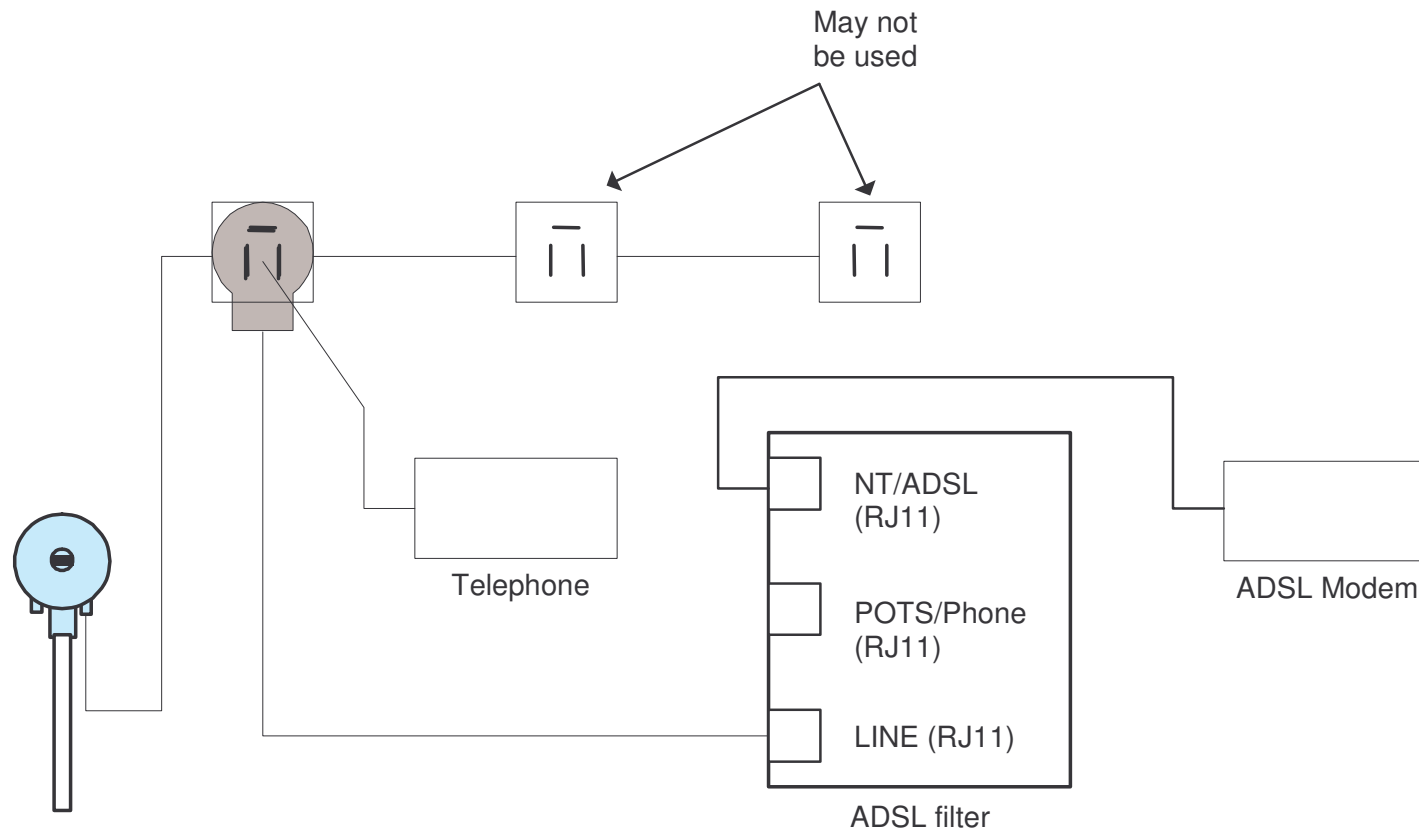
# Line qualification

SHDSL				
Speed	Max. attenuation at 150kHz [db]		accept without calculation	
	dB		Distance	LTS
576/576	40	OK	2,5 km	238 nF
1152/1152	28	OK	1,8 km	167 nF
2304/2304	22	OK	1,4 km	131 nF

# Installation with KAP plug



# Do-It-Yourself installation





# ADSL splitter





## Small Splitter (bottom view)



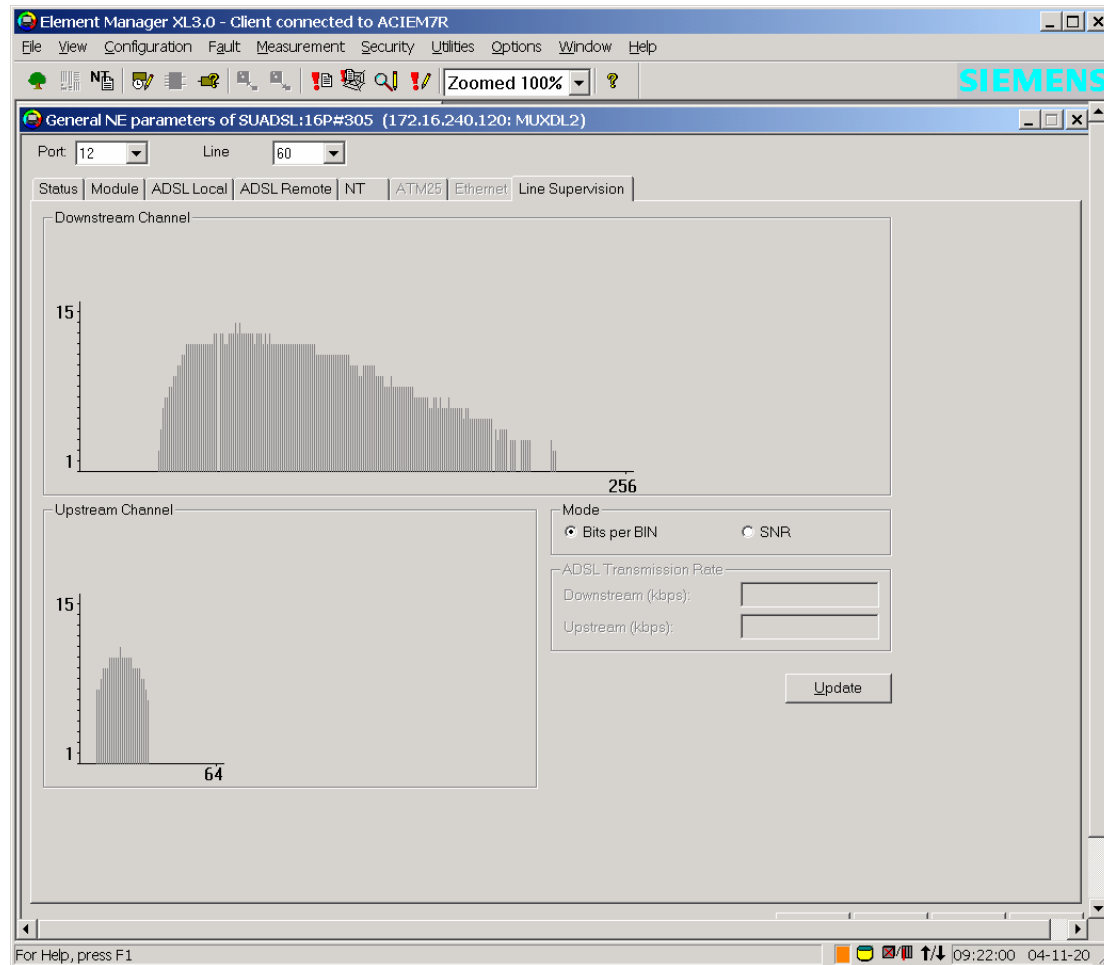
## Small Splitter (top view)



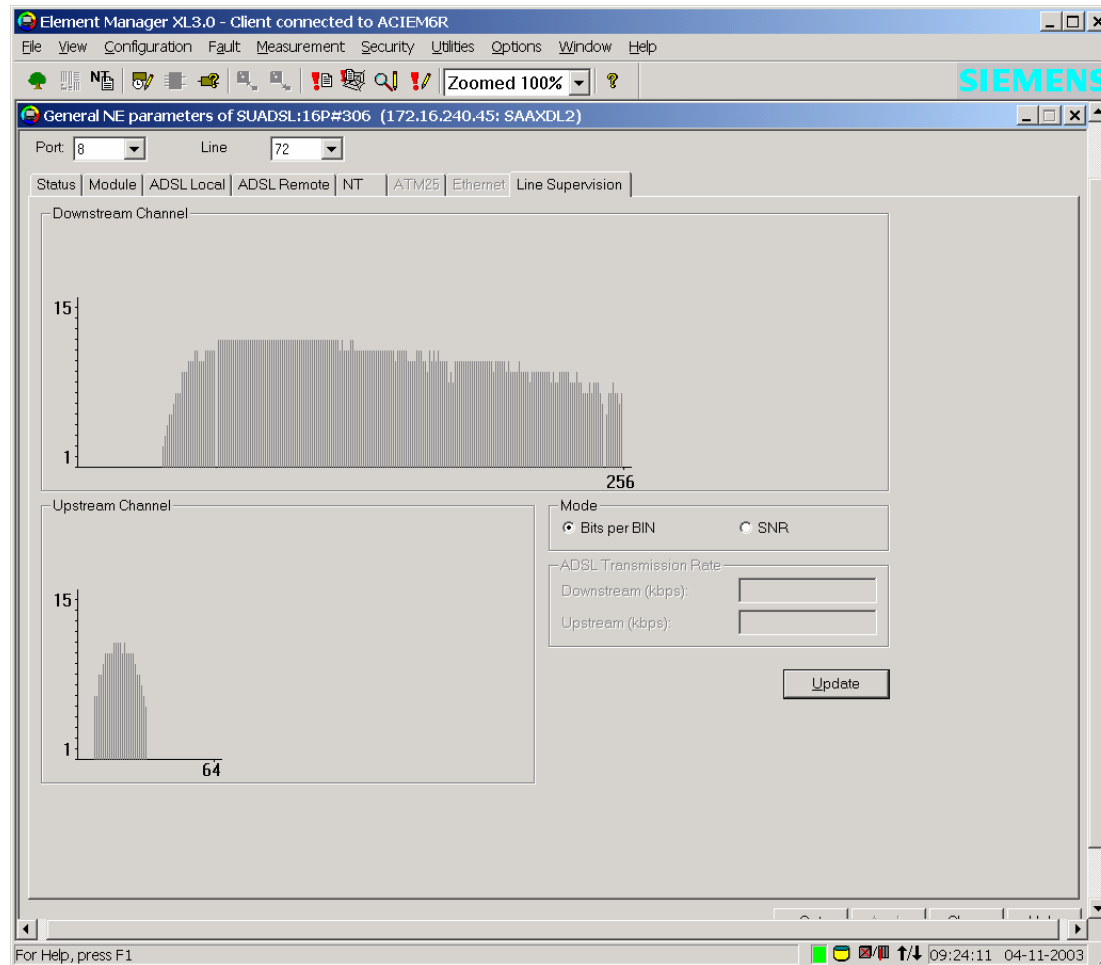
## Small Splitter (mounted)



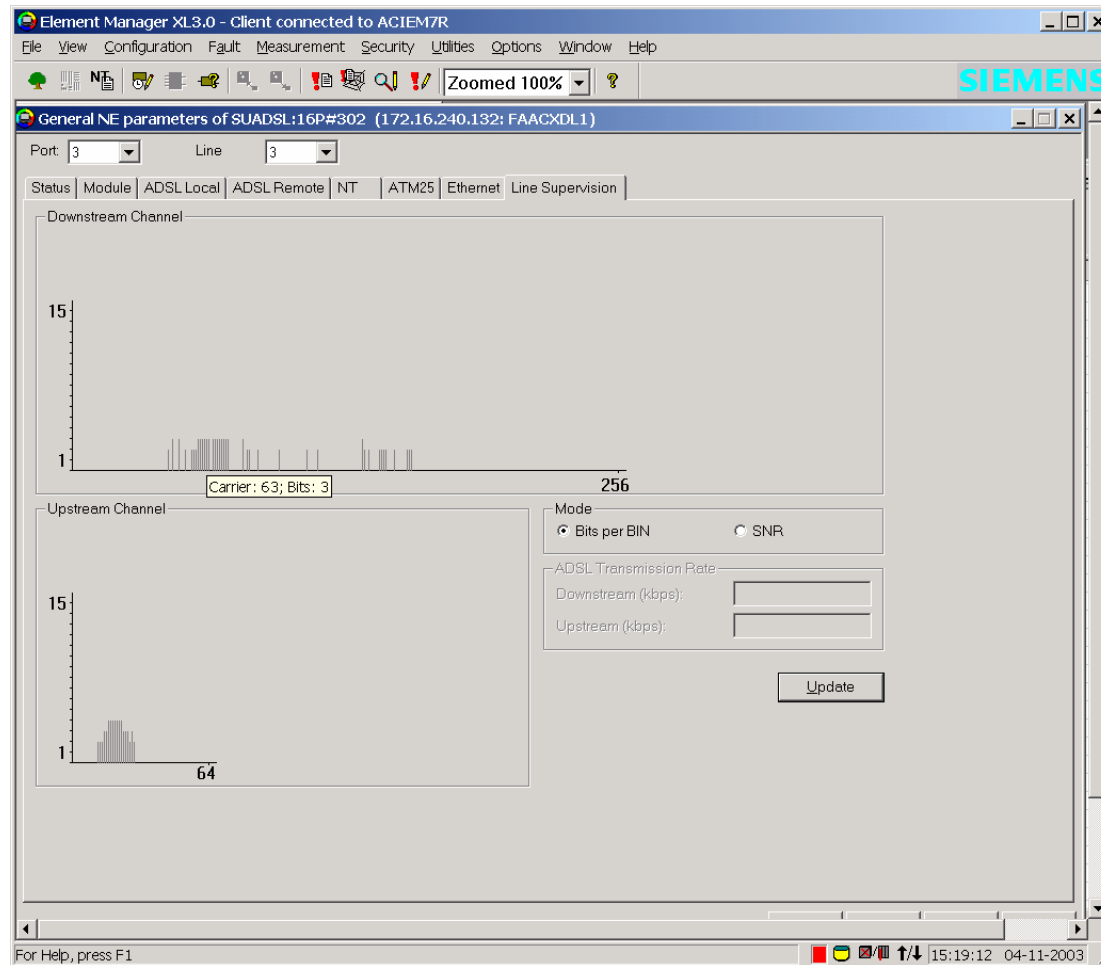
# 768/8096 reduced speed



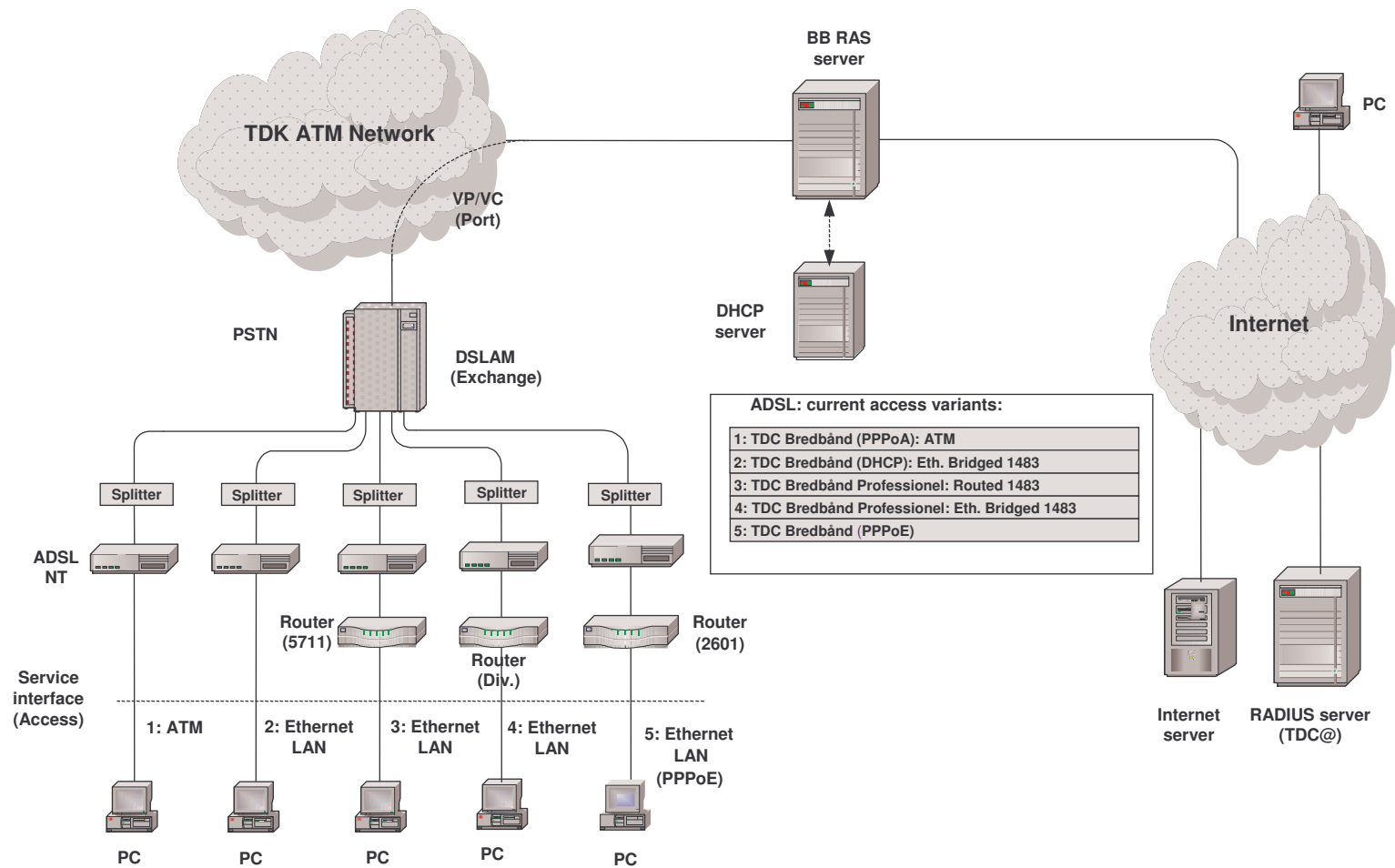
# 768/8096 full speed



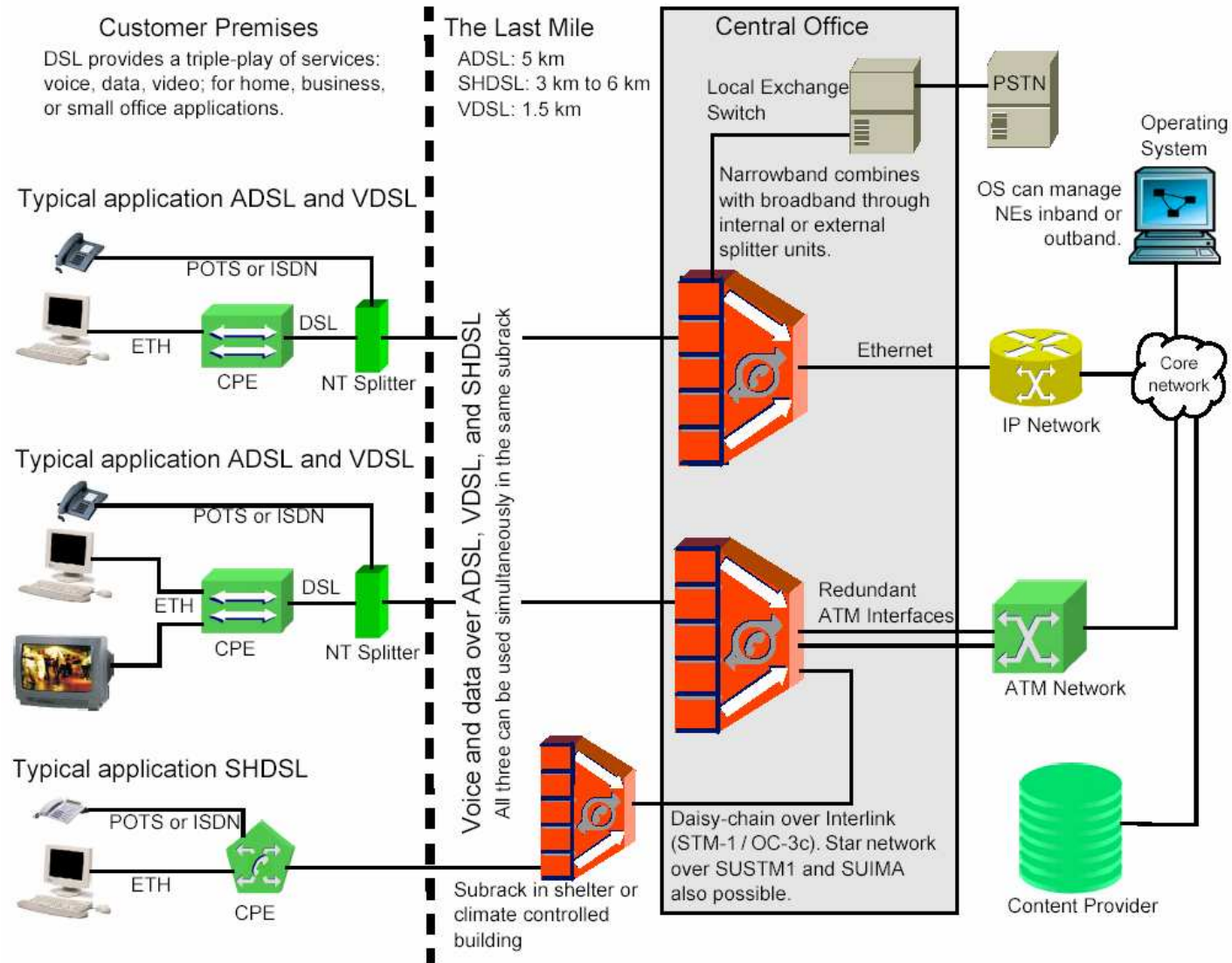
# Standard 128/256



# TDC ADSL - Overview



# DSL triple play





# SpeedStream 2601 router



# SpeedStream 2601 router



# Ericsson modem



# Ericsson modem



# Siemens modem



# Siemens modem





# SpeedStream 5100 modem



# SpeedStream 5100 modem





# Speedstream 5400 modem



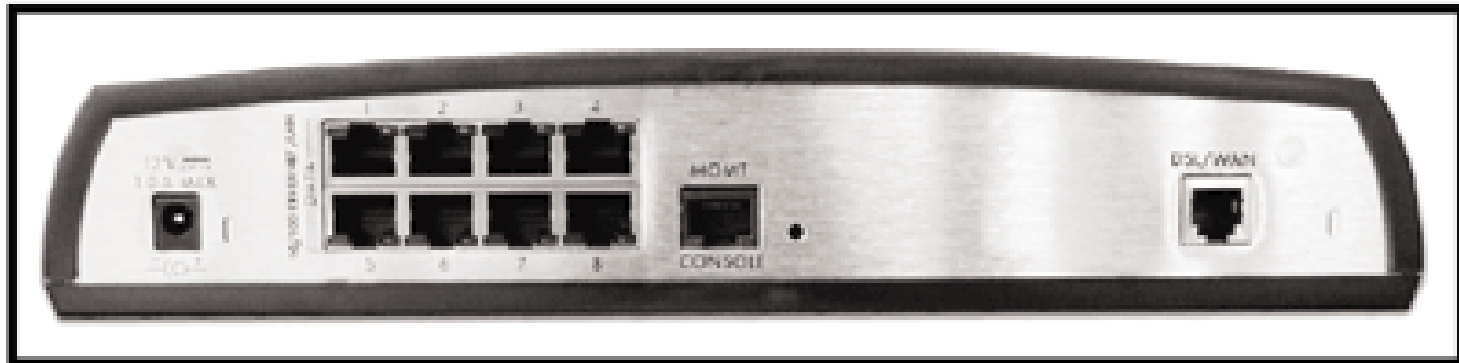
# Speedstream 5400 modem



## SHDSL router/modem Speedstream 5950



## SHDSL router/modem Speedstream 5950



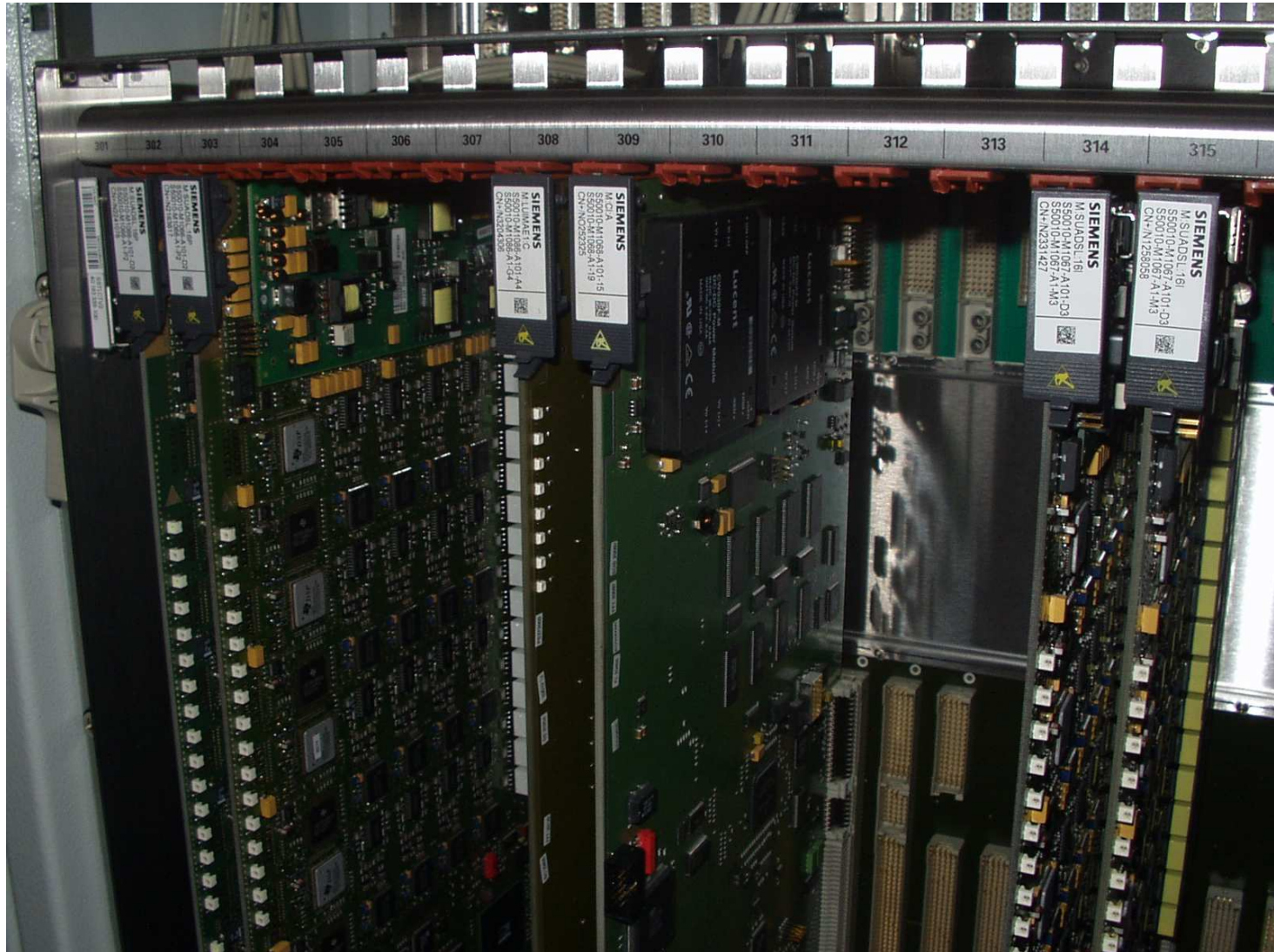
5950 back panel view

# Siemens DSLAM 3.1





# Siemens DSLAM 2.1

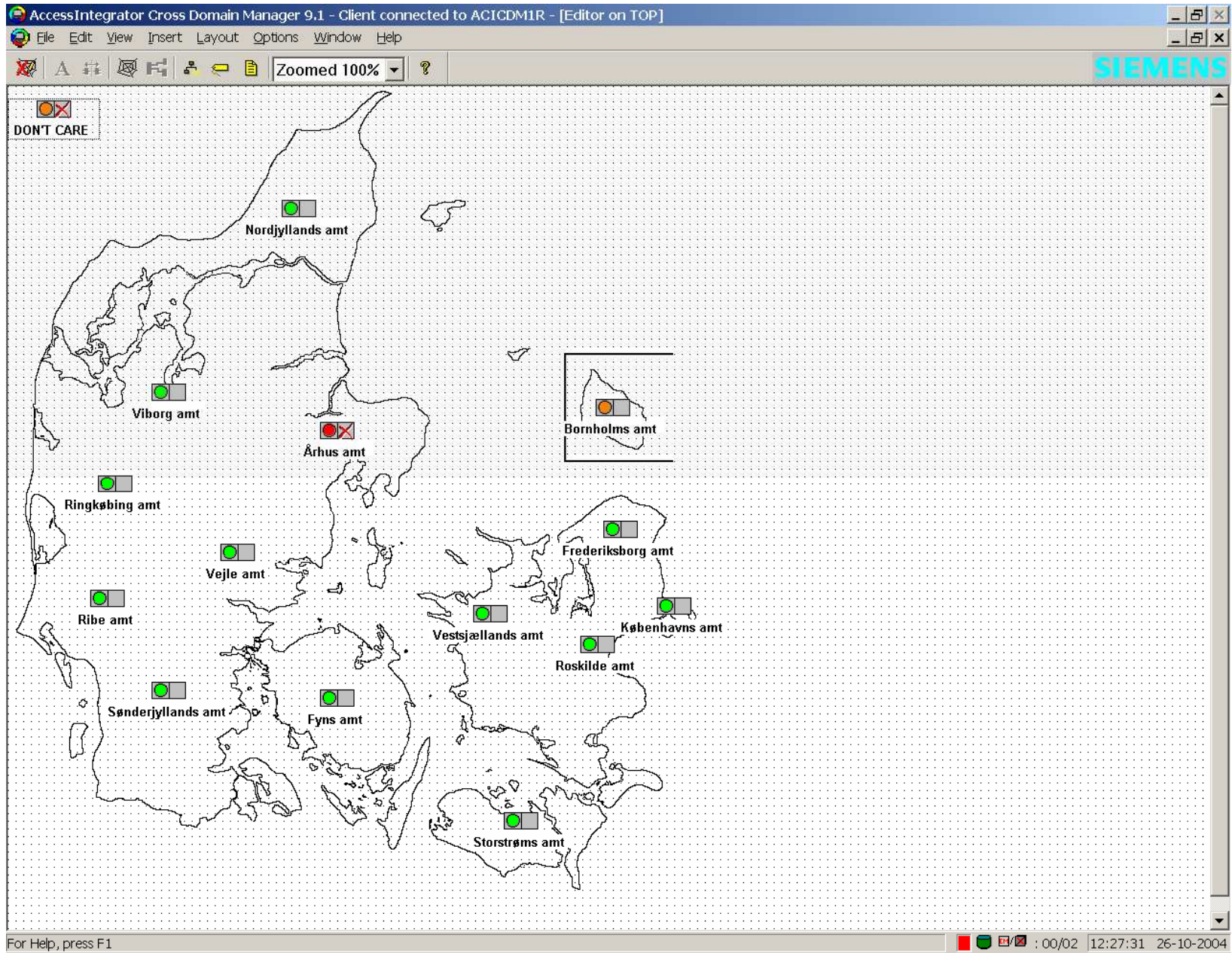












AccessIntegrator Cross Domain Manager 9.1 - Client connected to ACICDM1R - [TOP:Århus amt]

File View Fault Security Utilities Options Window Help

Zoomed 100%

SIEMENS

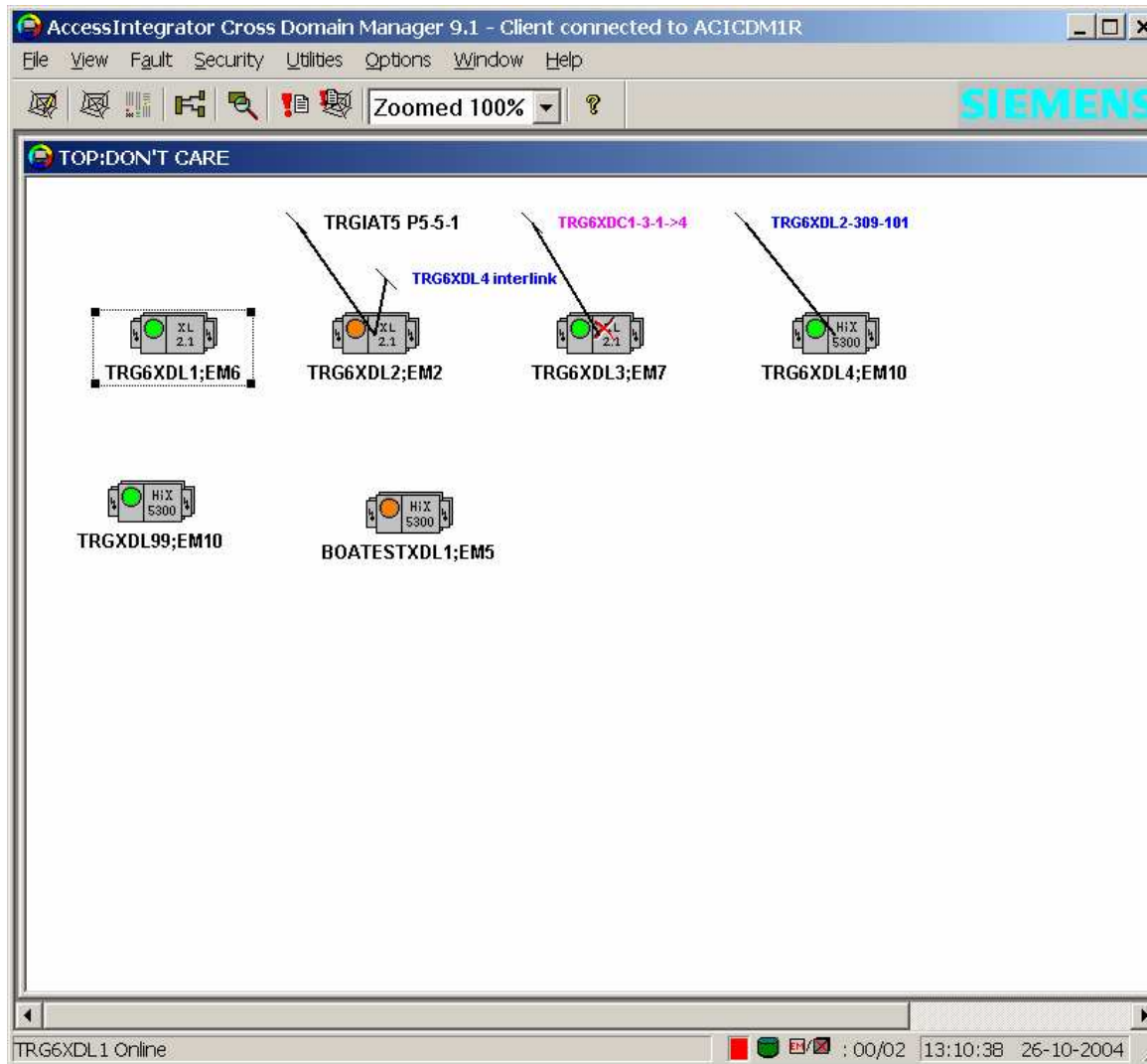
TOP:Århus amt

Allingåbro	Balle	Ebeltoft	Farre	Galten	Hadsten	Knebel	Langå	Malling	Nimtofte	Odder	Pindstrup	Randers	Sabro	Them	Vejlby
Assens	Beder	Femøller	Gammel Ry	Hammel	Kolind	Laurbjerg	Mariager	Nordby (Samsø)				Resenbro	Silkeborg	Thorsager	Virklund
Assentoft	Bjerregrav	Funder	Gjellerup	Harlev	Kragelund	Lime (Rd)	Mundelstrup					Risskov	Skanderborg	Thorsø	Voldum
Auning	Boulstrup-hou	Fårvang	Gjern	Hasselager		Lindbjerg	Mørke					Rude (Jyll)	Skødstrup	Tirstrup	
Bredstrup		Fårup	Gjerlev (Jyll)	Havndal		Lisbjerg						Ryomgård	Skejby	Todbjerg	
Brabrand		Glesborg	Hinnerup	Helgenæs		Låsby						Ry	Skægkær	Tranbjerg	
Bøstrup		Grauballe	Hornslet									Rønde	Skæring	Tranebjerg	
		Grenå	Hundslund									Råsted	Skåde	Trustrup	
		Grønfeldt	Hylke										Skåde	Taaning	
													Slet		
													Solbjerg		
													Sorring		
													Stilling		
													Svejbæk		
													Svejstrup		
													Spentrup		

For Help, press F1

13:08:16 26-10-2004

# A DSLAM Group (Don't care)



# Siemens DSLAM (NE view)

Element Manager hiX 5300 V1.0 - Client connected to ACIEM6R

File View Configuration Fault Measurement Security Utilities Options Window Help

Zoomed 100%

SIEMENS

General NE parameters of TRG6XDL1 (172.16.240.87)

Network Element

Status	Profile order list	Date/Time	Configuration	Telnet Management	SHDSL Specific	SNMP Parameter
●	301	UPL:A	unlocked	enabled	available	initialized 4
●	302	SUADSL16P	unlocked	enabled	available	initialized 2
●	303	SUADSL16P	unlocked	enabled	available	initialized 2
●	304	SUADSL16P	unlocked	enabled	available	initialized 2
●	305	SUADSL16P	unlocked	enabled	available	initialized 2
●	306	SUADSL16P	unlocked	enabled	available	ok 2
●	307	SUADSL16P	locked	enabled	available	initialized 4
●	308	SUADSL16P	locked	disabled	not installed	initialized 1
●	309	CLU155.OS	unlocked	enabled	available	initialized 1
●	310	SUSHDSL16	unlocked	enabled	available	initialized 2
●	311	SUADSL16P	unlocked	enabled	available	initialized 2
●	312	SUADSL16P	unlocked	enabled	available	initialized 2
●	313	SUIMAE1:16C	unlocked	enabled	available	initialized 2
●	314	SUADSL16I	unlocked	enabled	available	initialized 2
●	315	SUADSL16I	unlocked	enabled	available	initialized 2
●	316	SUADSL16I	unlocked	enabled	available	initialized 2
●	317	SUADSL16I	unlocked	enabled	available	initialized 2

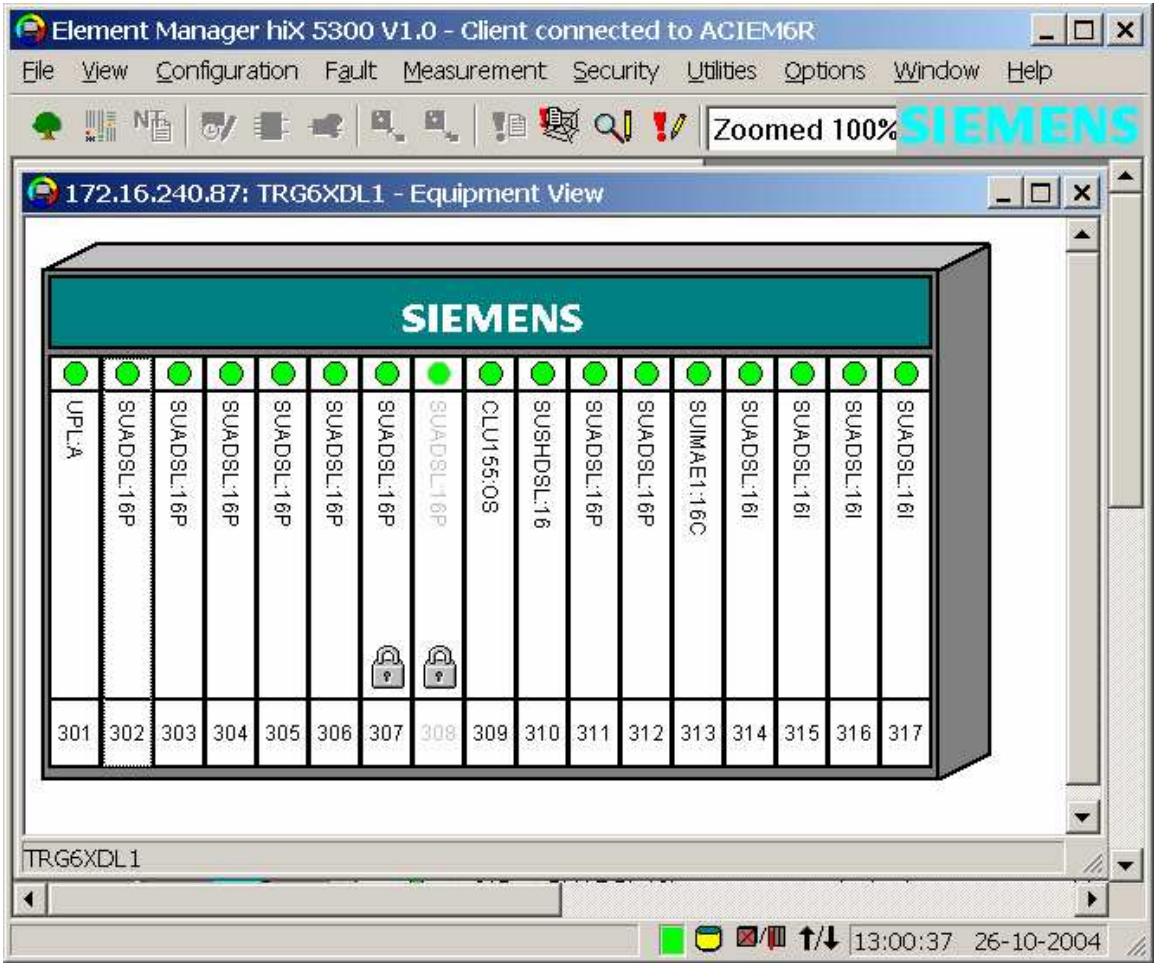
Update Status

Get Apply Close Help

Ready 17 17

For Help, press F1 12:57:45 26-10-2004

# Siemens DSLAM (AccessIntegrator)





# Siemens DSLAM (E1IMA)

Element Manager hiX 5300 V1.0 - Client connected to ACIEM6R

File View Configuration Fault Measurement Security Utilities Options Window Help

Zoomed 100%

SIEMENS

General NE parameters of TRG6XDL1 (172.16.240.87)

**E1 IMA**

Module: SUIMAE1:16C#313 Link: 1 Group: 1

Status	E1 Parameter	Group Parameter	Link Parameter			
I	Group...	Link...	Line in...	Administrative st...	Operational state	
🔒	1	-	145	locked	disabled	
🔒	1	1	145	locked	disabled	
🔒	1	2	145	locked	disabled	
🔒	1	3	145	locked	disabled	
🔒	1	4	145	locked	disabled	
🔒	1	5	145	locked	disabled	
🔒	1	6	145	locked	disabled	
🔒	1	7	145	locked	disabled	
🔒	1	8	145	locked	disabled	
🔒	2	-	146	locked	disabled	
🔒	2	9	146	locked	disabled	
🔒	2	10	146	locked	disabled	
🔒	2	11	146	locked	disabled	
🔒	2	12	146	locked	disabled	
🔒	2	13	146	locked	disabled	
🔒	2	14	146	locked	disabled	
🔒	2	15	146	locked	disabled	
🔒	2	16	146	locked	disabled	

Update Status

Get Apply Close Help

Ready 34 34

Consistent SUIMAE1:16C 13:04:03 26-10-2004

# Siemens DSLAM (SUADSL)

Element Manager hiX 5300 V1.0 - Client connected to ACIEM6R

File View Configuration Fault Measurement Security Utilities Options Window Help

Zoomed 100%

SIEMENS

SNMP General NE parameters of TRG6XDL1 (172.16.240.87)

ADSL

Module: SUADSL16P#302 Port: 1 Line: 1

Status: ADSL Local | ADSL Remote | NT | ATM25 | Ethernet | Line Supervision

	Port...	Line in...	Customer ID	Profile	Profile st...	Link state	Local admin...	Remote admin...	Operational...
X	1	1	...	None	none	quiet	unlocked	unlocked	disabled
X	2	2	...	None	none	quiet	unlocked	unlocked	disabled
X	3	3	...	None	none	quiet	unlocked	unlocked	disabled
X	4	4	...	None	none	quiet	unlocked	unlocked	disabled
X	5	5	...	None	none	quiet	unlocked	unlocked	disabled
X	6	6	...	None	none	active	unlocked	unlocked	enabled
X	7	7	...	None	none	active	unlocked	unlocked	enabled
X	8	8	...	None	none	quiet	unlocked	unlocked	disabled
X	9	9	...	None	none	quiet	unlocked	unlocked	disabled
X	10	10	...	None	none	quiet	unlocked	unlocked	disabled
X	11	11	...	None	none	active	unlocked	unlocked	enabled
X	12	12	...	None	none	active	unlocked	unlocked	enabled
X	13	13	...	None	none	active	unlocked	unlocked	enabled
X	14	14	...	None	none	active	unlocked	unlocked	enabled
X	15	15	...	None	none	active	unlocked	unlocked	disabled
X	16	16	...	None	none	quiet	unlocked	unlocked	disabled

Get Profile Log Clear Profile Log Apply Profile Update Status

Get Apply Close Help

Verifying profiles... 76 76

For Help, press F1 12:52:00 26-10-2004





# Siemens DSLAM (line supervision)

The screenshot displays the Siemens Element Manager interface for configuring and monitoring ADSL services. The main window is titled "General NE parameters of TRG6XDL1 (172.16.240.87)".

**ADSL Configuration:**

- Module: SUADSL16P#302
- Port: 6
- Line: 6

**Status:** ADSL Local | ADSL Remote | NT | ATM25 | Ethernet | Line Supervision

**Downstream Channel:** A bar chart showing signal levels across 255 bins. The y-axis ranges from 1 to 15.

**Upstream Channel:** A bar chart showing signal levels across 63 bins. The y-axis ranges from 1 to 15.

**Mode:**  Bits per BIN |  SNR

**ADSL Transmission Rate:**

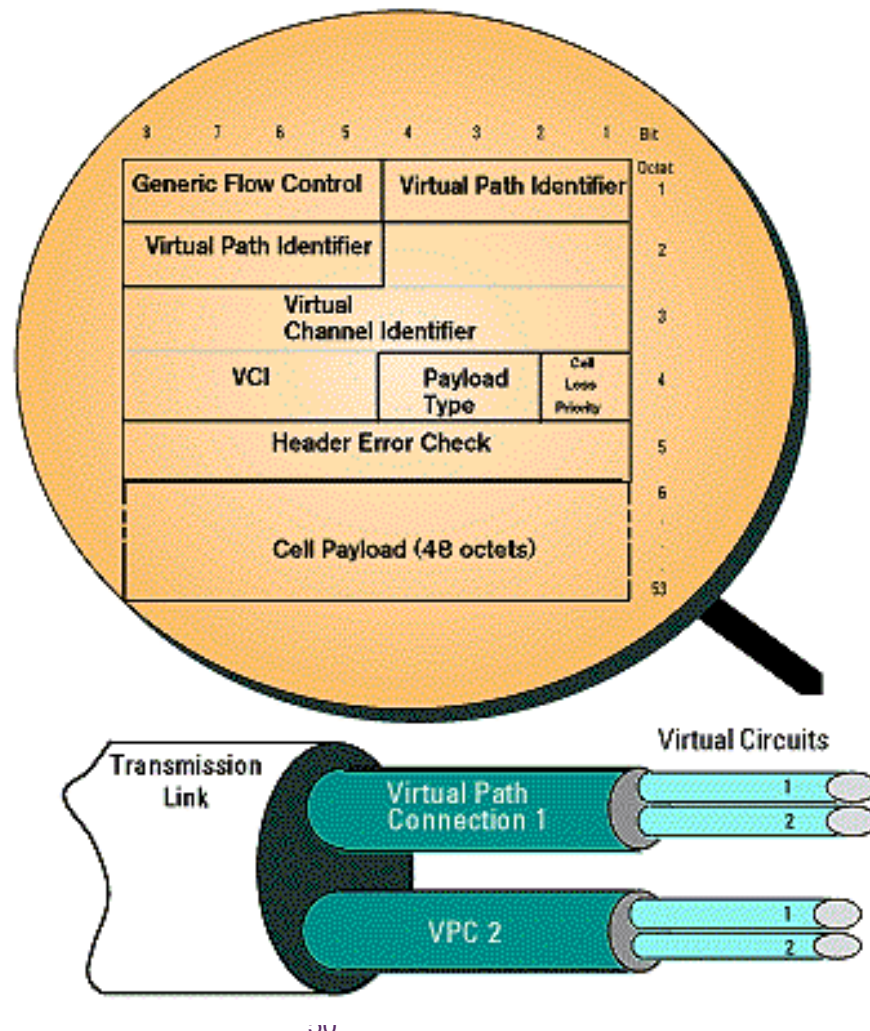
- Downstream (kbps): [ ]
- Upstream (kbps): [ ]

**Buttons:** Export.. | Update

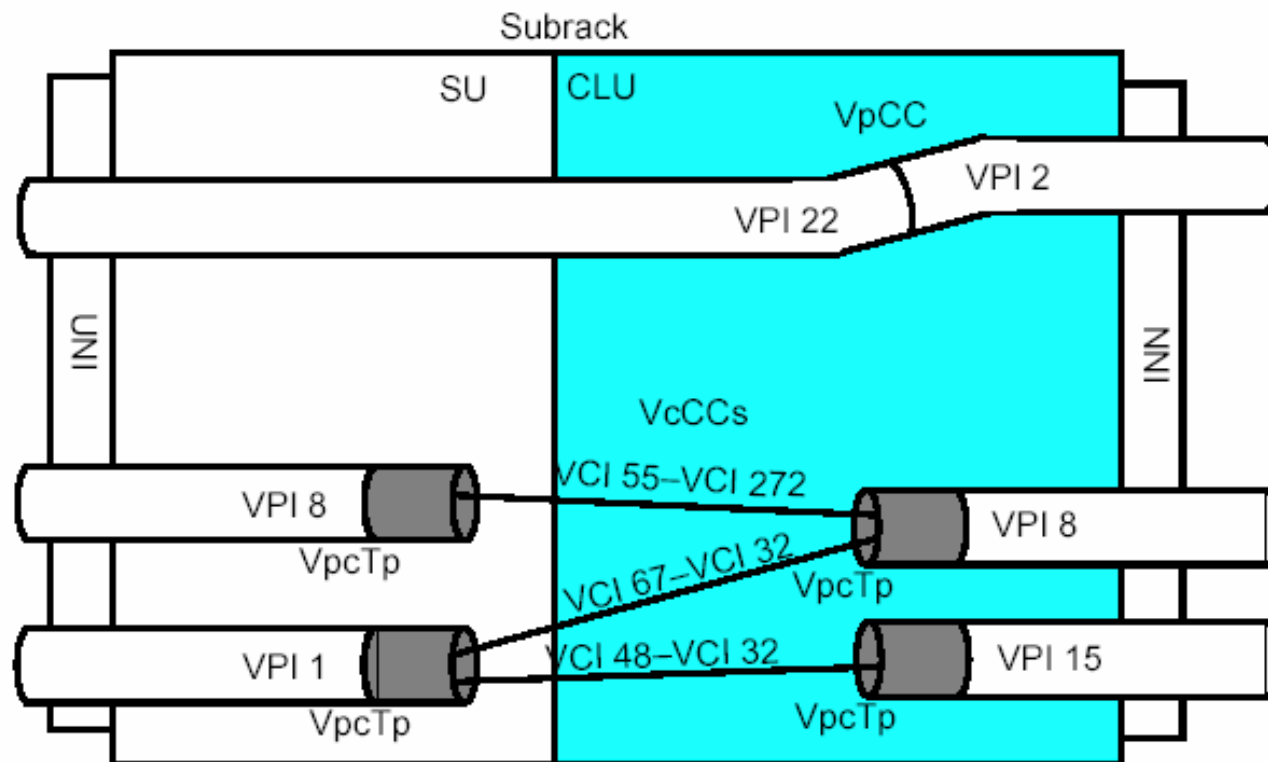
**Bottom Panel:** Get | Apply | Close | Help | 07 [ ] 07

**System Information:** For Help, press F1 | 12:55:41 26-10-2004

# ATM technology



# ATM cross connects



# Siemens DSLAM (cross connects)

Element Manager XL3.0 - Client connected to ACIEM1R

File View Configuration Fault Measurement Security Utilities Options Window Help

Zoomed 100%

Cross Connection - a:172.16.240.87

Virtual Path Cross Connection Virtual Path Connection TP Multicast Vpc for video channels

Video Channel VccTp Virtual Channel Cross Connection Traffic Parameter Inband Connection

!	Line ...	Module	P	N...	VP...	VC...	VP...	VC...	Alarm...	Admin...	Oper...	T...	TDup...	T...	TD...
●	2	SUADSL:16P#302	2	CPE	0	101	101	102	clear	unlocked	disabled	39		40	
●	3	SUADSL:16P#302	3	CPE	0	101	10	101	clear	unlocked	enabled	39		40	
●	4	SUADSL:16P#302	4	CPE	0	32	20	130	clear	unlocked	disabled	39		40	
●	4	SUADSL:16P#302	4	CPE	0	101	0	101	clear	unlocked	disabled	39		40	
●	5	SUADSL:16P#302	5	AT...	0	101	101	105	clear	unlocked	disabled	39		40	
●	5	SUADSL:16P#302	5	Eth...	130	32	101	1005	clear	unlocked	disabled	39		40	
●	6	SUADSL:16P#302	6	AT...	0	101	101	106	clear	unlocked	disabled	39		40	
●	6	SUADSL:16P#302	6	Eth...	130	32	101	1006	clear	unlocked	disabled	39		40	
●	7	SUADSL:16P#302	7	AT...	0	101	101	107	clear	unlocked	disabled	39		40	
●	7	SUADSL:16P#302	7	Eth...	130	32	101	1007	clear	unlocked	disabled	39		40	
●	8	SUADSL:16P#302	8	AT...	0	101	101	108	clear	unlocked	disabled	39		40	
●	8	SUADSL:16P#302	8	Eth...	130	32	101	1008	clear	unlocked	enabled	39		40	
●	9	SUADSL:16P#302	9	AT...	0	101	101	109	clear	unlocked	disabled	39		40	
●	9	SUADSL:16P#302	9	Eth...	130	32	101	1009	clear	unlocked	disabled	39		40	
●	10	SUADSL:16P#302	10	CPE	0	101	101	110	clear	unlocked	disabled	39		40	
●	11	SUADSL:16P#302	11	Eth...	130	32	101	111	clear	unlocked	disabled	39		40	
●	12	SUADSL:16P#302	12	Eth...	130	32	101	112	clear	unlocked	disabled	39		40	
●	13	SUADSL:16P#302	13	AT...	0	101	101	113	clear	unlocked	disabled	39		40	
●	14	SUADSL:16P#302	14	Eth...	130	32	101	1014	clear	unlocked	enabled	39		40	
●	14	SUADSL:16P#302	14	AT...	0	101	101	114	clear	unlocked	disabled	39		40	

For Help, press F1

01:00 00:00 14:45:49 19-11-02

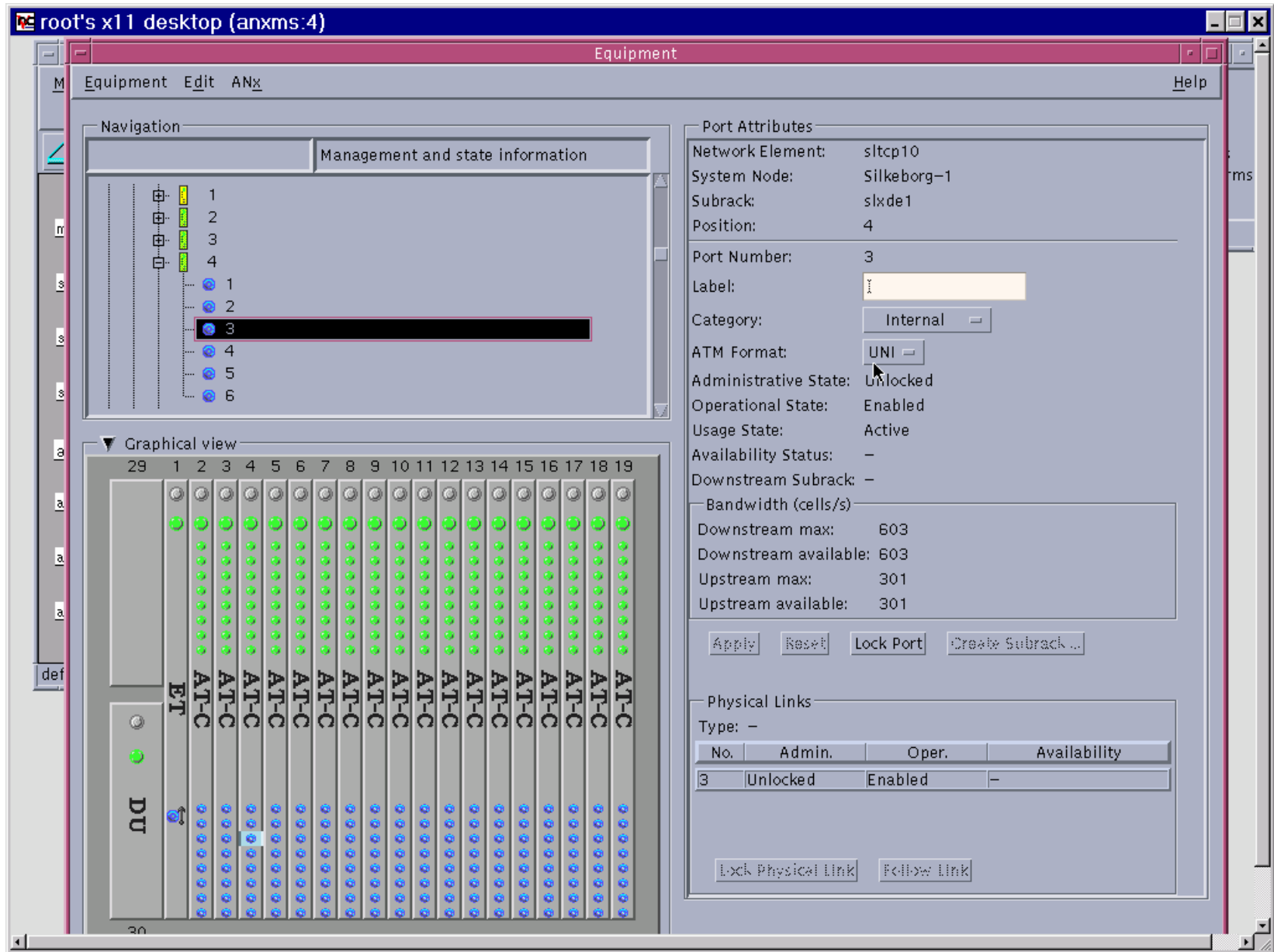
# Ericsson concentrator



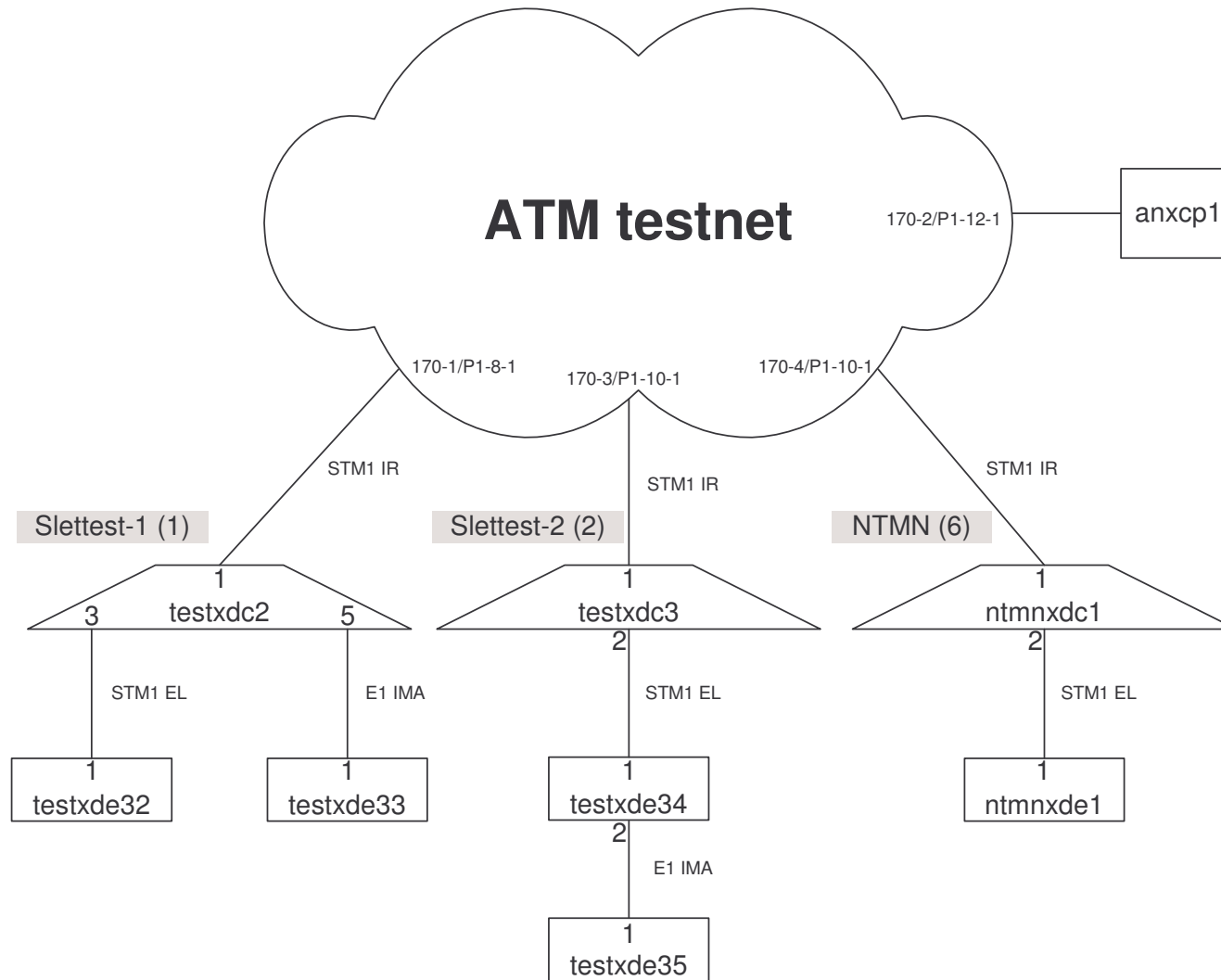


# Ericsson DSLAM





# Ericsson Testnet





root's x11 desktop (anxms:4)

Equipment

Equipment Edit ANx Help

Navigation Management and state information Subrack Attributes

Network Element: sltcp10

System Node: silkeborg-1 Filter Status: Search result

PVC Management

PVC Selected Properties ANx Help

Network Element: sltcp10

System Node: silkeborg-1 Filter Status: Search result

PVC List

User Side T=Terminal ID S:P=Subrack:Position	Port	VPI	VCI	Service Side T=Terminal ID S:P=Subrack:Position	Port	VPI	VCI	Continuity Check	Admin State	Opern State	Availability
T=slxde1-71	1	0	101	S:P=slxdc1:1	1	32	233	Disabled	Unlocked	Enabled	-
T=slxde1-109	1	0	101	S:P=slxdc1:1	1	32	400	Disabled	Unlocked	Enabled	-
T=slxde1-34	1	0	101	S:P=slxdc1:1	1	32	1241	Disabled	Unlocked	Enabled	-
T=slxde1-80	1	0	101	S:P=slxdc1:1	1	32	152	Disabled	Unlocked	Enabled	-
<b>T=slxde1-5</b>	<b>1</b>	<b>0</b>	<b>101</b>	<b>S:P=slxdc1:1</b>	<b>1</b>	<b>33</b>	<b>419</b>	<b>Disabled</b>	<b>Unlocked</b>	<b>Enabled</b>	<b>-</b>
T=slxde1-118	1	0	101	S:P=slxdc1:1	1	32	475	Disabled	Unlocked	Enabled	-
T=slxde1-43	1	0	101	S:P=slxdc1:1	1	32	36	Disabled	Unlocked	Enabled	-
T=slxde1-81	1	0	101	S:P=slxdc1:1	1	32	154	Disabled	Unlocked	Enabled	-
T=slxde1-14	1	0	101	S:P=slxdc1:1	1	33	445	Disabled	Unlocked	Enabled	-
T=slxde1-127	1	0	101	S:P=slxdc1:1	1	32	423	Disabled	Unlocked	Enabled	-

PVC Details

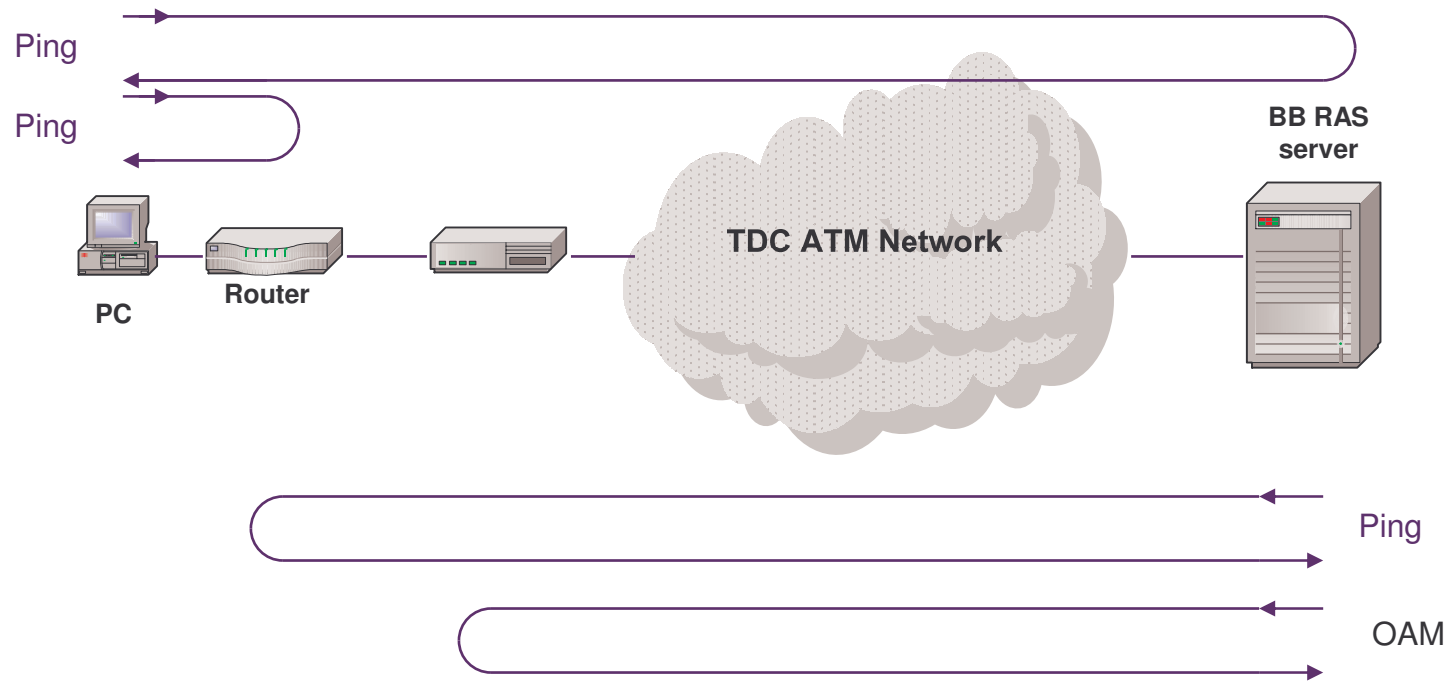
Service Class: Unspecified Bit Rate

Source Type: Early Packet Discard

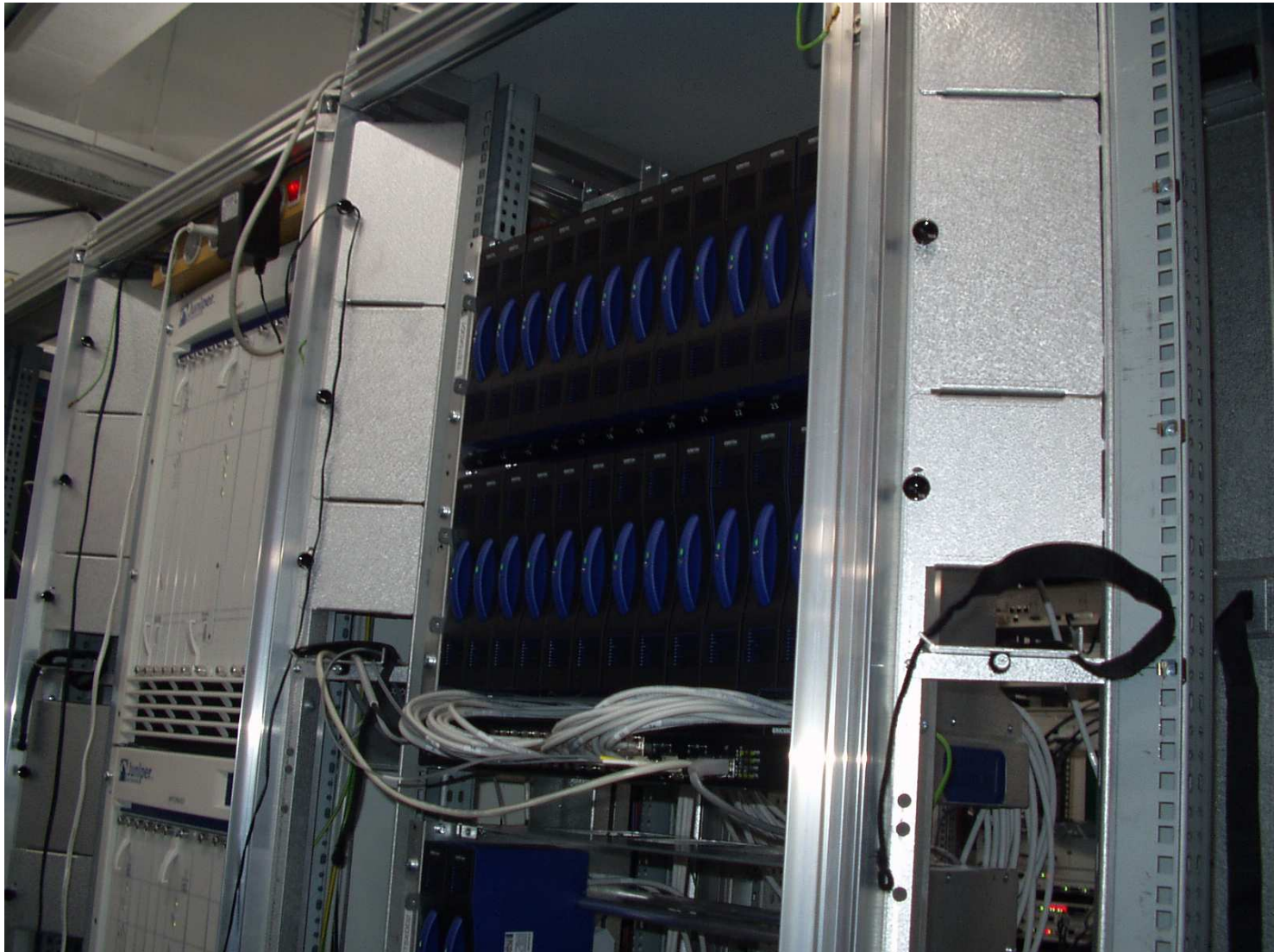
Bandwidth Down/Up: 0 0 cells/s

Type: vcc

# Debugging



# Ethernet DSLAM

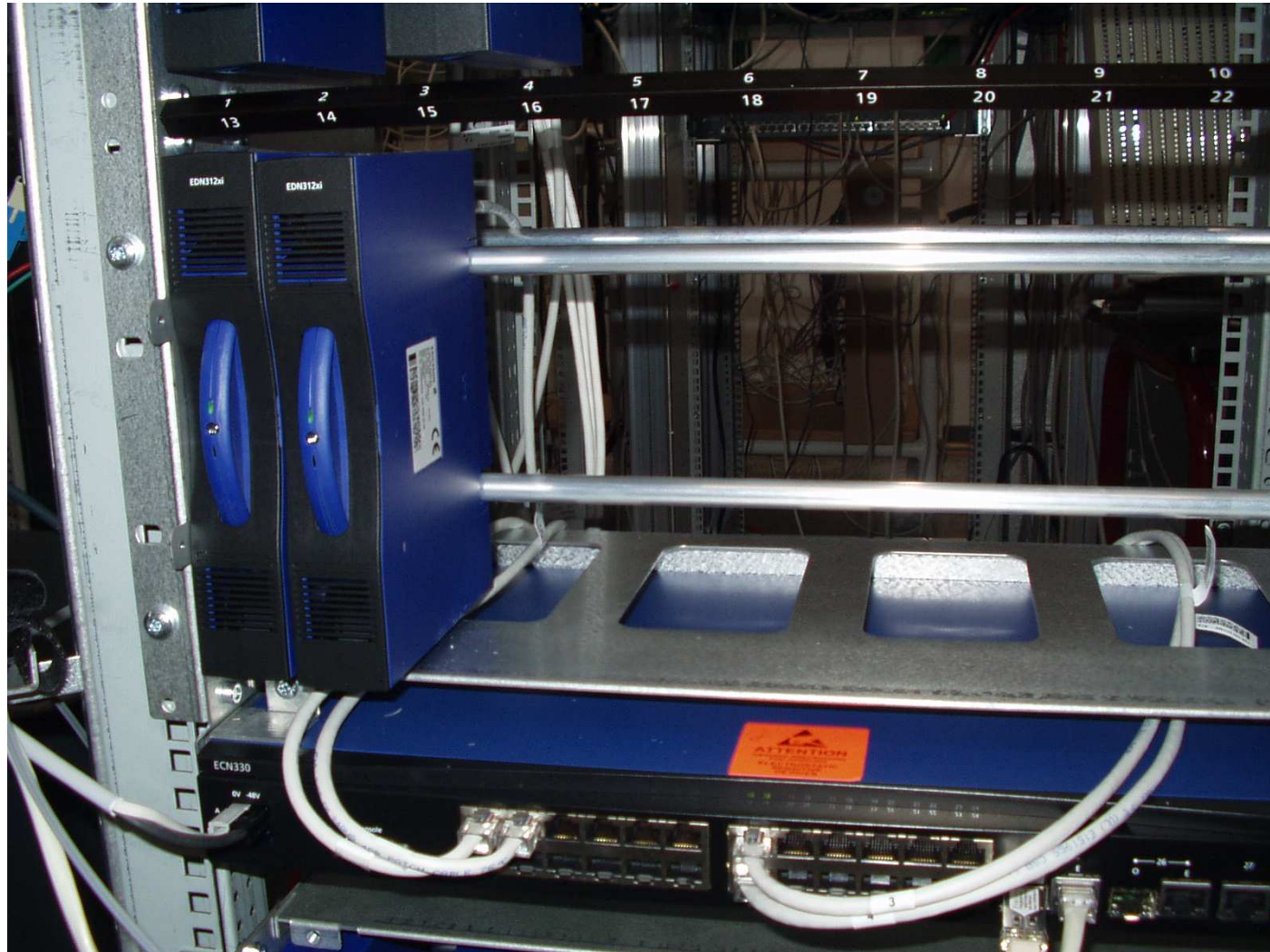


# Ethernet DSLAM





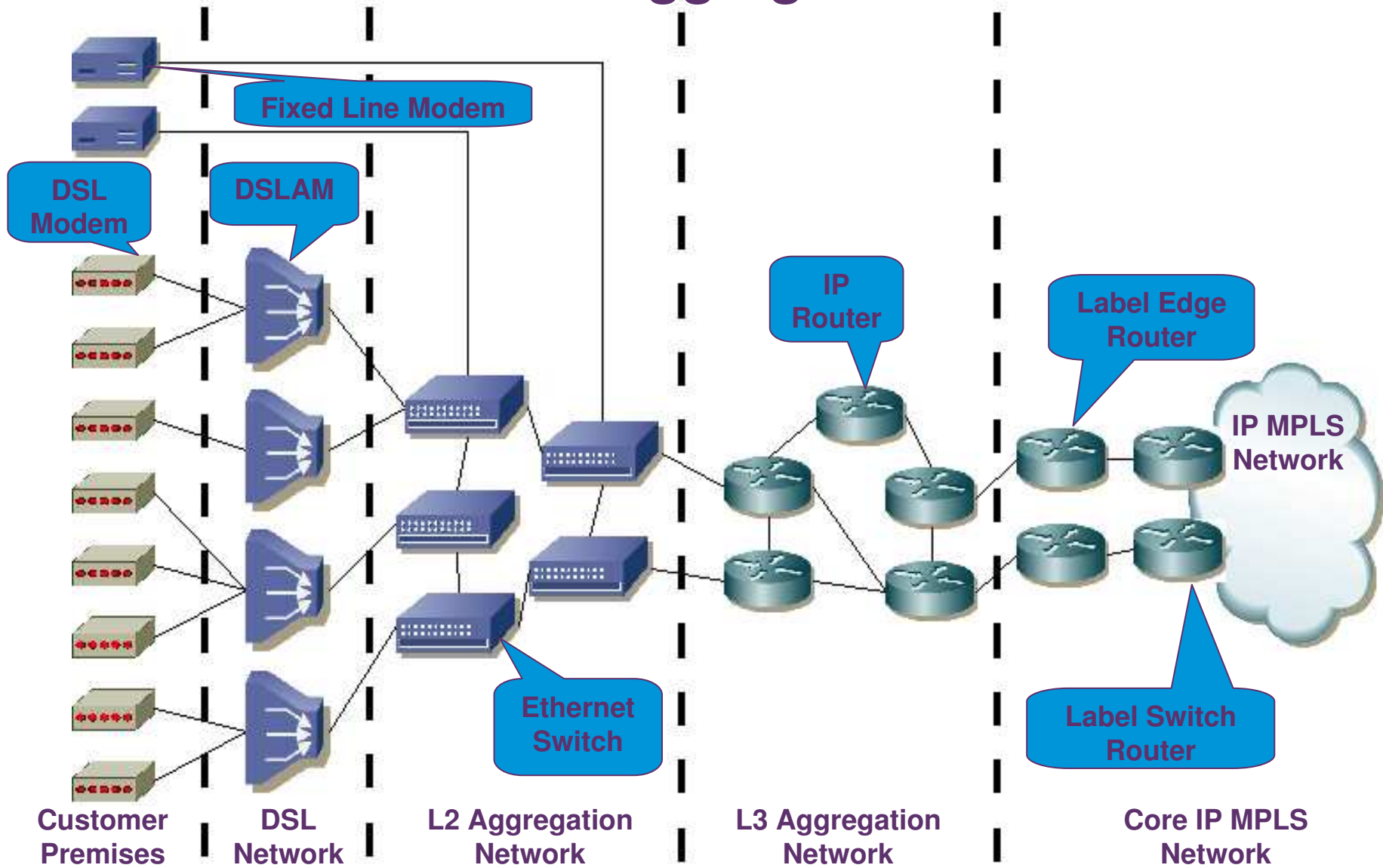
# Ethernet DSLAM



# Ethernet DSLAM



# Ethernet Aggregation Network





# DHCP option 82, suboption 1

- **Format: Fixed length: 12 bytes**
  - 01:xx:xx:xx:xx:00:yy:00:zz:pp:cc:cc
  - xx:xx:xx:xx: DSLAM IP address.
  - DSLAM MDF position: yy.0.zz.
  - pp: UNI VPI
  - cc:cc: UNI VCI
- **The DSLAM MDF position is related to the logical TDC port number by:**
  - Logical port: n: n=1-288
  - MDF position: yy.0.zz: y=1-24, and z=1-12.
  - $n = (y-1)*12+z$