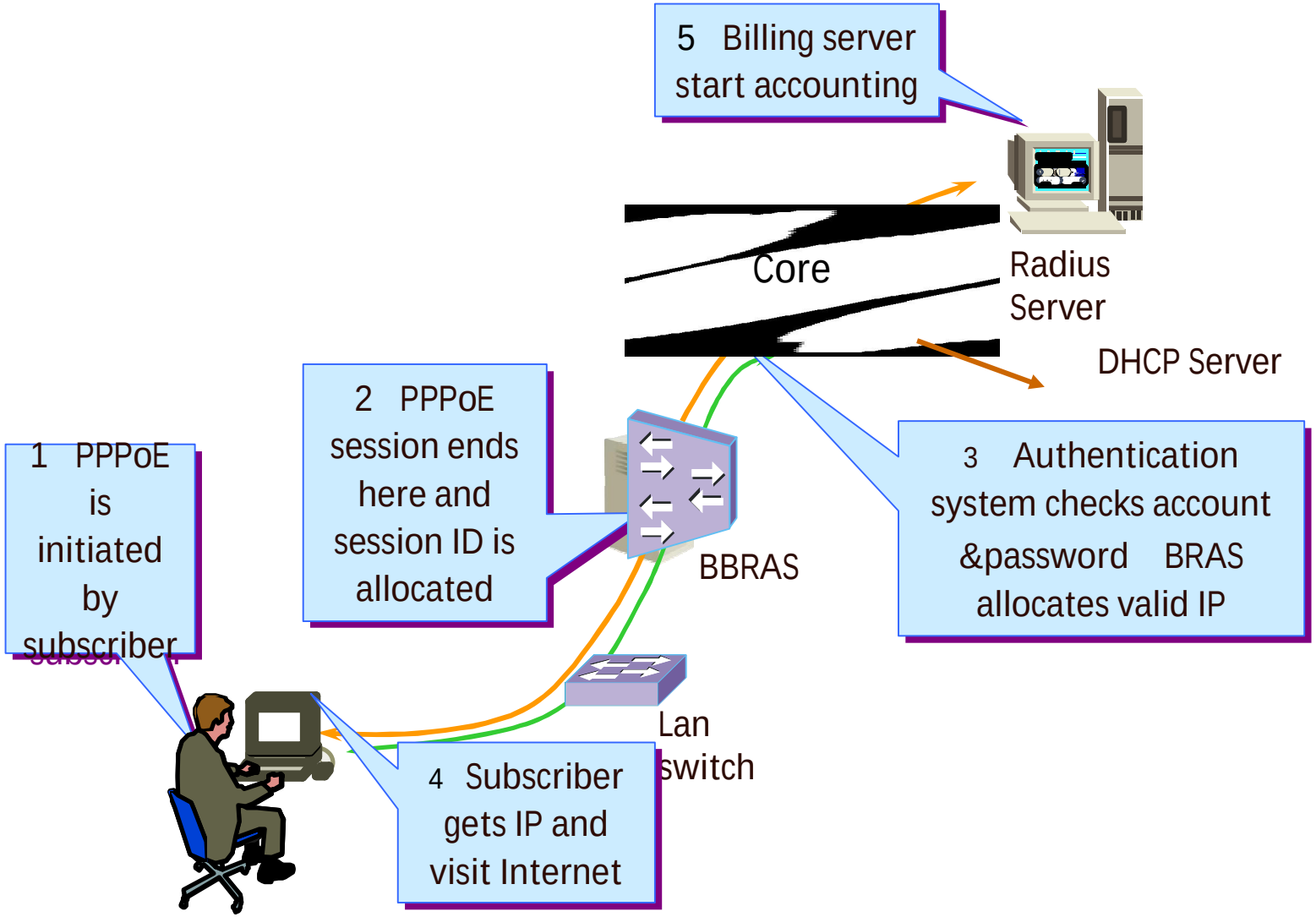
Broadband Technology

An Overview Cont..

How Broadband Service Works?



BB Service Flow

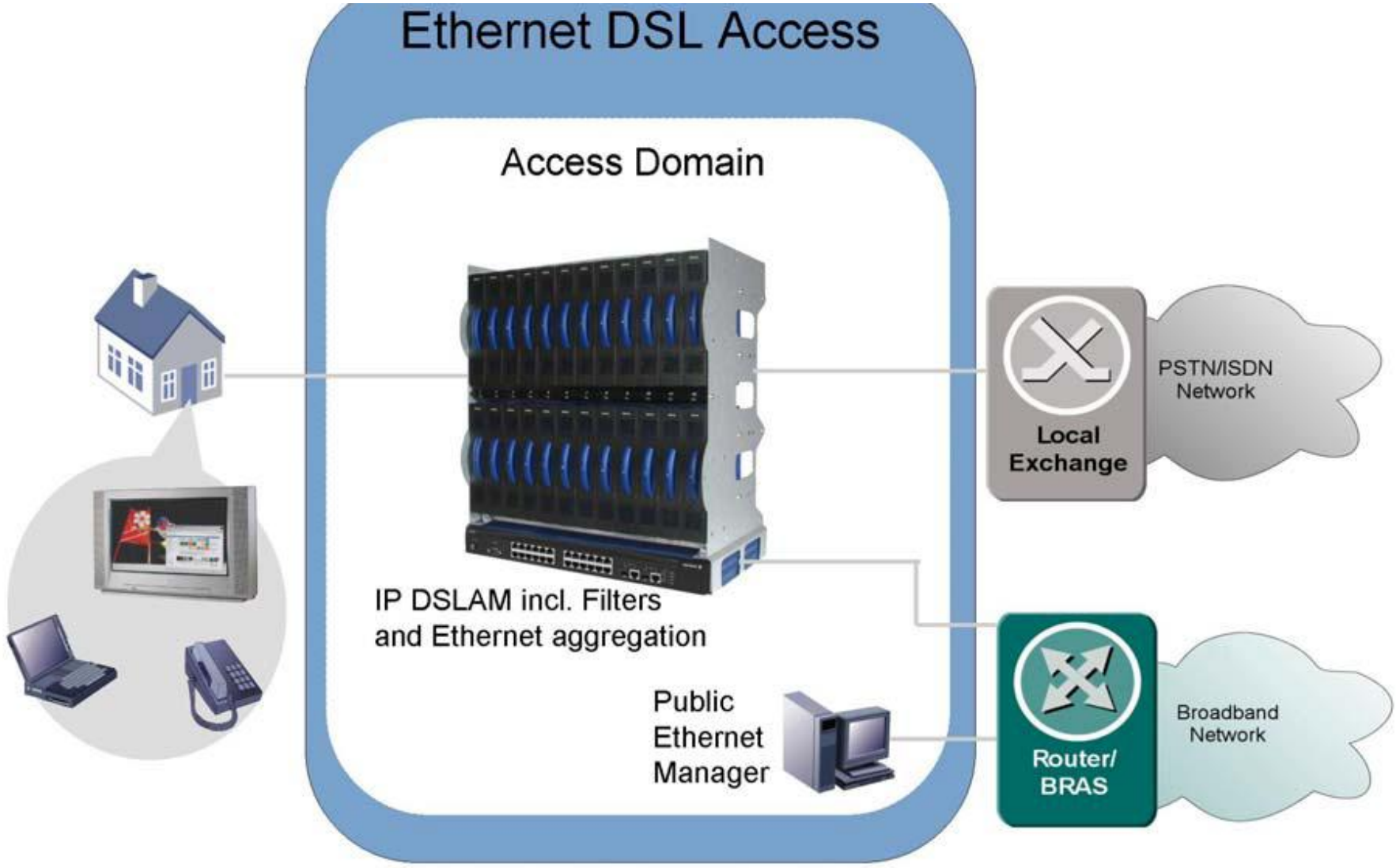
PC à CPEà DSLAM à T2à T1 à BRAS

Service flow begins from Client à BRAS which terminated PPP sessions.

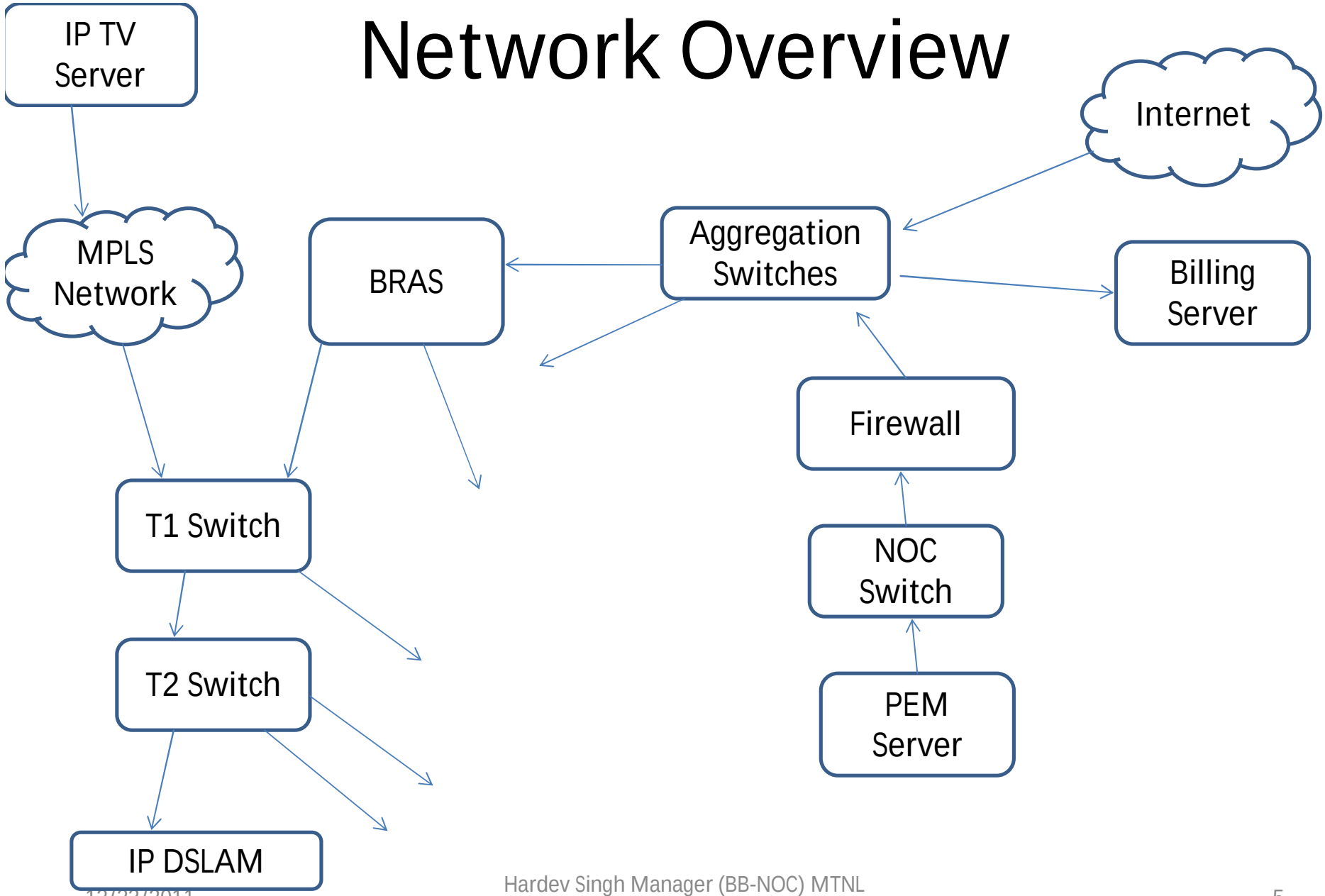
The process for user connection to internet is:

1. Client starts pppoe session by using pppoe software.
2. ADSL modem translates IP packets into ATM cell.
3. DSLAM recovers ATM cells to IP packets.
4. DSLAM uses Q-in-Q protocol, which adds a new vlan tag to the recovered IP packets. Each user has a respective vlan..
5. T2 forwards IP packet to T1 & T1 transfers the IP packets to BRAS.
6. BRAS also supports Q-in-Q protocol according to different outer vlan and inner vlan to identify Different users.

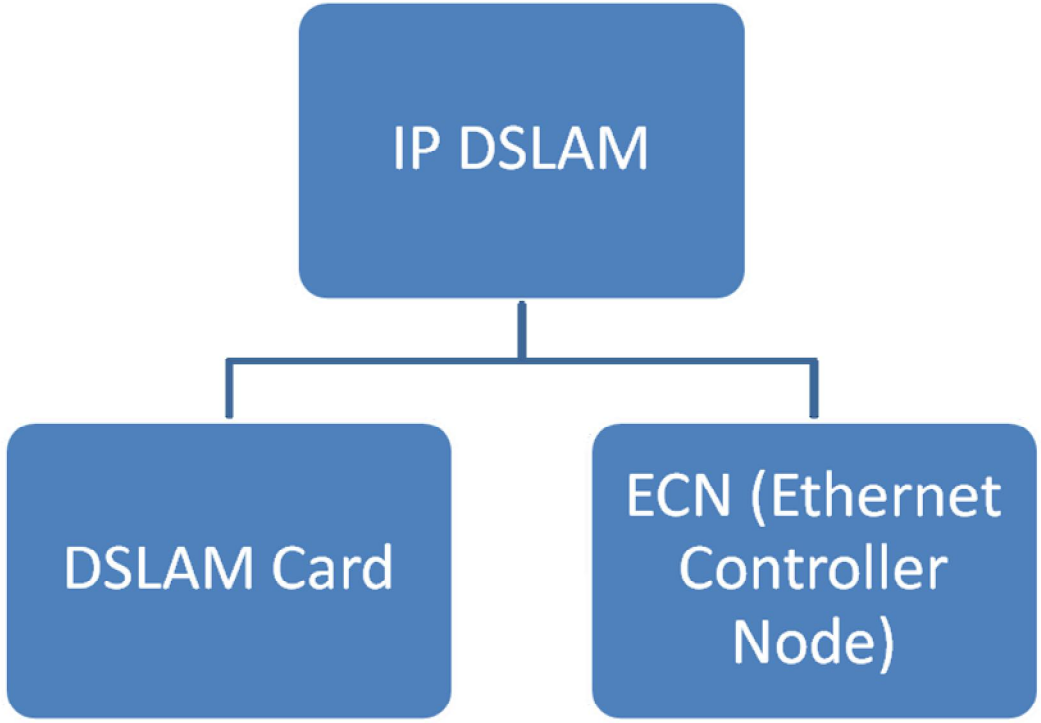
Ericsson Broadband Network



Network Overview



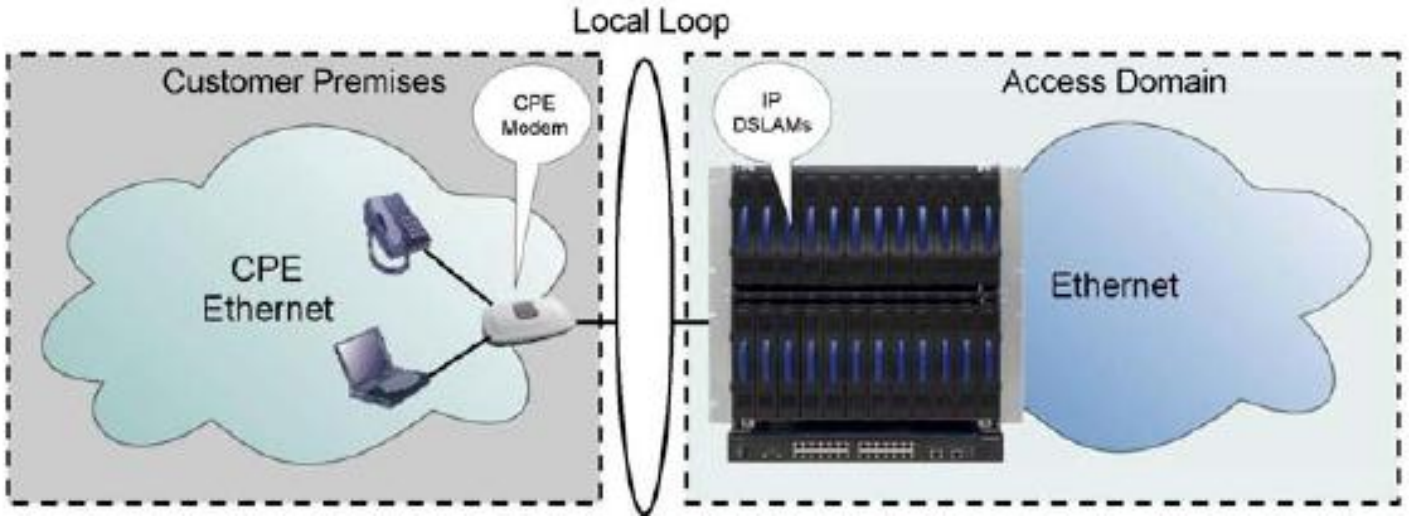
IP DSLAM



DSLAM Card

Definition: Digital Subscriber Line Access Multiplexer (DSLAM) is a network device, located in the telephone exchanges of the service providers, that connects multiple customer Digital Subscriber Lines (DSLs) to a high-speed Internet backbone line using multiplexing techniques.

Devices used in MTNL Network: EDN 312xp DSLAM cards are used in the network



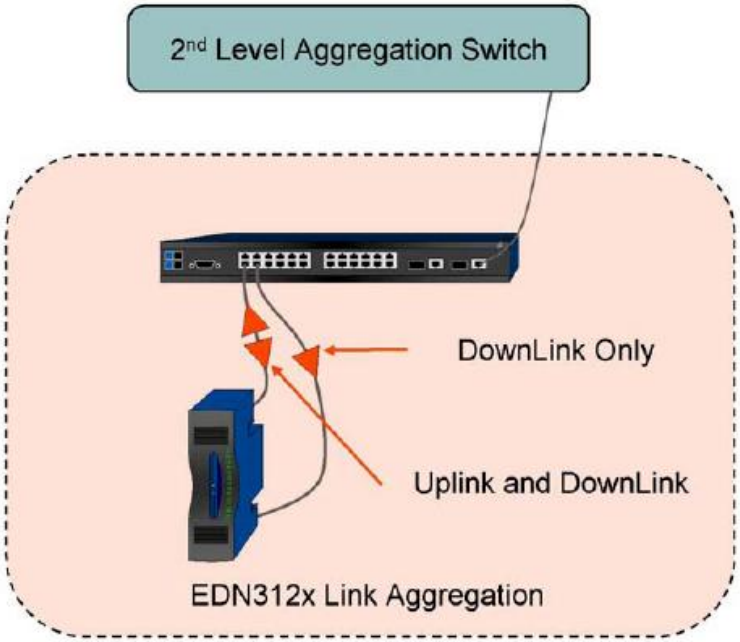
Important Features:

- Each card has capacity of connecting 12 subscribers simultaneously
- It can be powered over Ethernet cables and both data and power is conveyed in the same cable
- It terminates all end-user lines and is able to provide high speed IP access to all end users simultaneously
- It can support eight PVCs for each end user
- It can support Line Qualification Test.

ECN Card

Definition: It is an aggregation node which provides layer 2 Ethernet switching and subsequently connects the end user to various IP services through the access network.

Devices used in MTNL network:
Ethernet Controller Node (ECN-320)



ECN Card

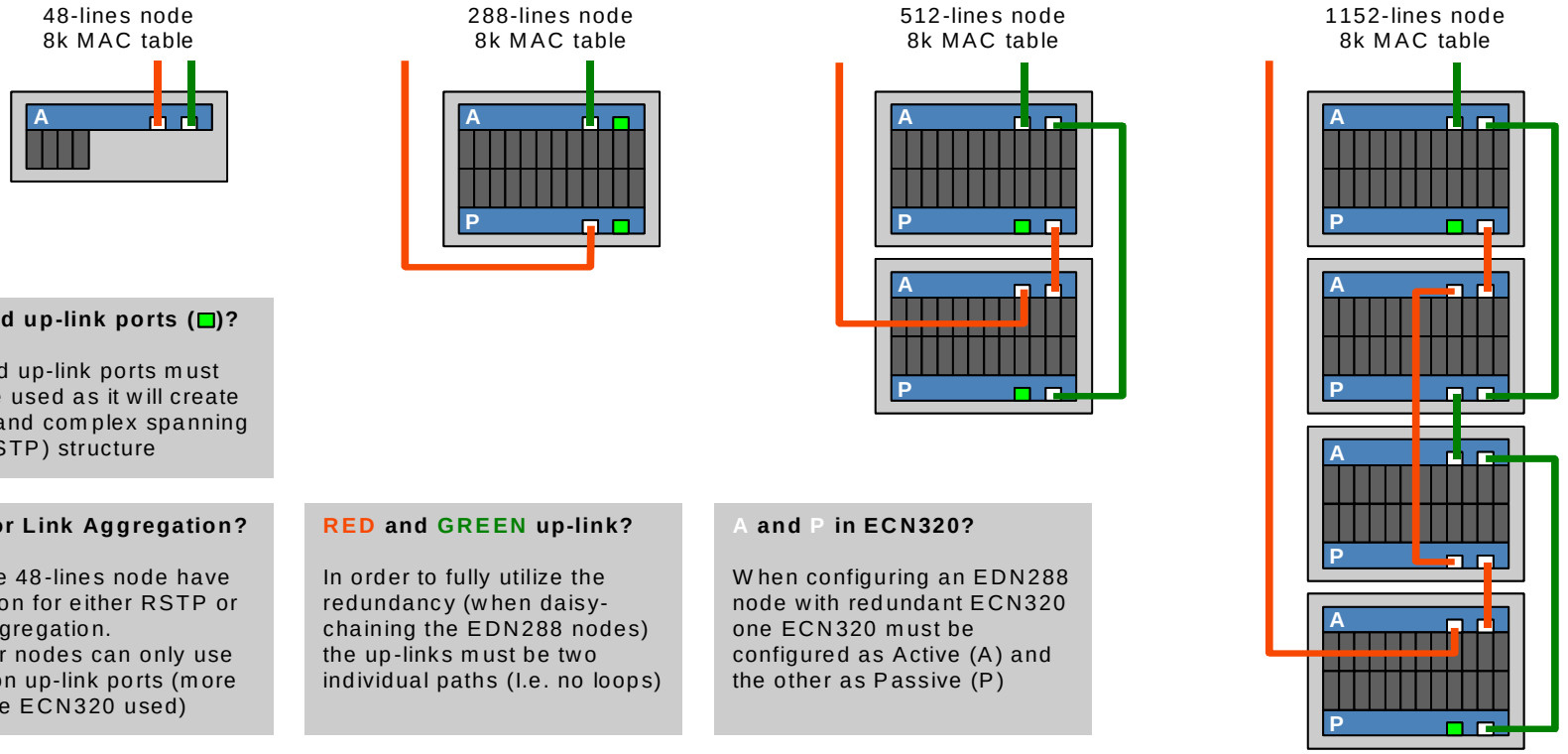
Important Features:

- Ø It manages and handles all functions of the embedded nodes (Acts as a proxy for PEM)
- Ø It contains 10BASE-T/100BASE-TX RJ-45 ports and two combo ports 10/100/1000BASE-T ports which operate in combination with Small Form Factor Pluggable (SFP) transceiver slots
- Ø It has two power supply ports
- Ø It provides comprehensive network management features

ECN 320 Cascading

ERICSSON

EDA large-node – ‘design rules’



Un-used up-link ports (■)?

Un-used up-link ports must NOT be used as it will create a slow and complex spanning tree (RSTP) structure

RSTP or Link Aggregation?

Only the 48-lines node have the option for either RSTP or Link Aggregation.
All other nodes can only use RSTP on up-link ports (more than one ECN320 used)

RED and GREEN up-link?

In order to fully utilize the redundancy (when daisy-chaining the EDN288 nodes) the up-links must be two individual paths (I.e. no loops)

A and P in ECN320?

When configuring an EDN288 node with redundant ECN320 one ECN320 must be configured as Active (A) and the other as Passive (P)

T1/T2 Switches

Definition: They are LAN switches used for aggregating and cross-connecting clients, servers and other network devices.

Devices used in MTNL: 3COM 7700 LAN Switches

LAN Switches

Important features of LAN Switch:

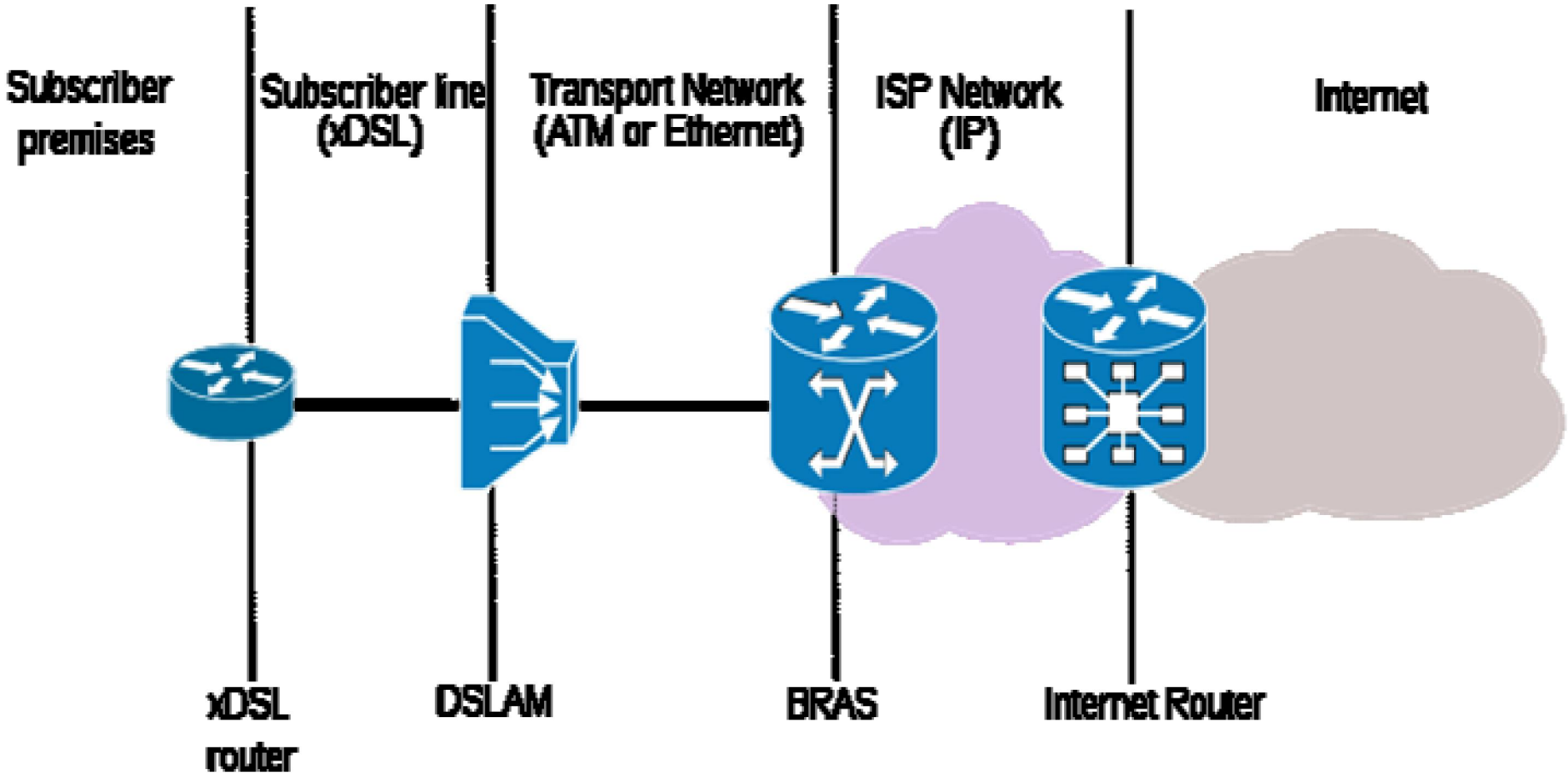
- Supports multiple service VLANs
- Aggregates links towards T1 switch or BRAS
- Supports multicasting
- Controls flow of Ethernet frames
- Ensures QoS for different types of traffic
- Allows management through CLI, Console, Telnet, SNMP and System log

Broadband Remote Access Server (BRAS)

Definition: BRAS is a network device used to route traffic to and from broadband remote access devices such as DSLAM on an ISP network. It aggregates users sessions from access network and plays major role policy management and QoS.

Devices used in MTNL: Juniper ERX 1440

BRAS Functioning



BRAS

Important Features:

- Ø Aggregates the circuits from access devices such as DSLAMs
- Ø Provides layer 2 connectivity through either transparent bridging or PPP sessions over Ethernet
- Ø Enforces quality of service (QoS) policies
- Ø Provides layer 3 connectivity and routes IP traffic through Internet service provider's backbone network to the Internet

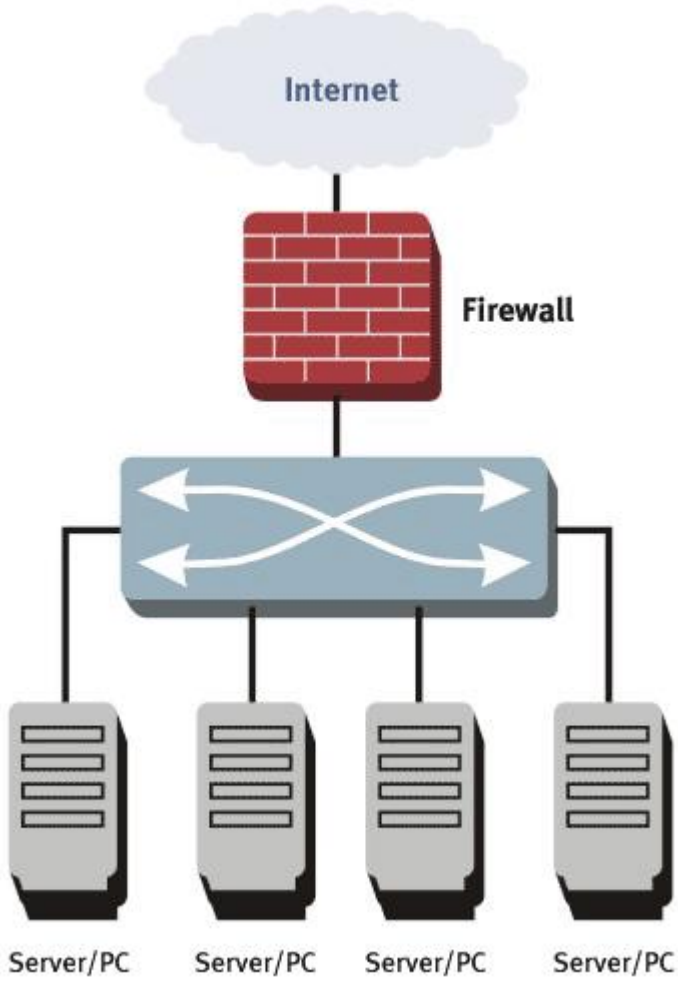
Firewall

Definition: It is a part of the network that is designed to block unauthorized access while permitting authorized communications. It is configured to permit or deny network transmissions based upon a set of rules and other criteria.

Devices used in MTNL: Juniper Netscreen ISG 2000

Important Features:

- ISG firewall can deliver security features such as intrusion prevention system (IPS), Antispam Web filtering, and Internet Conten Adaptation Protocol (ICAP) antiviru redirection support
- It allows deployment of security policies that isolate guests and NO servers or databases
- It provides fiber interfaces
- It supports multiple routing protocols such as OSPF, BGP, RIP

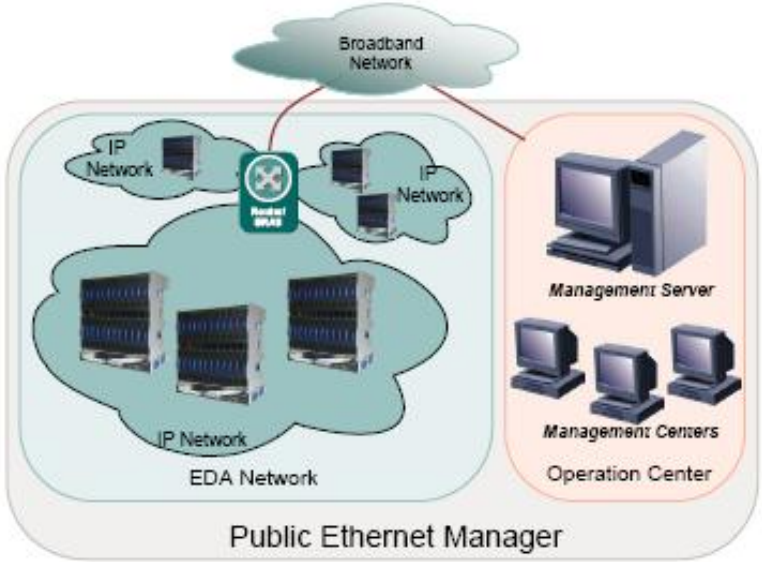


Management Server

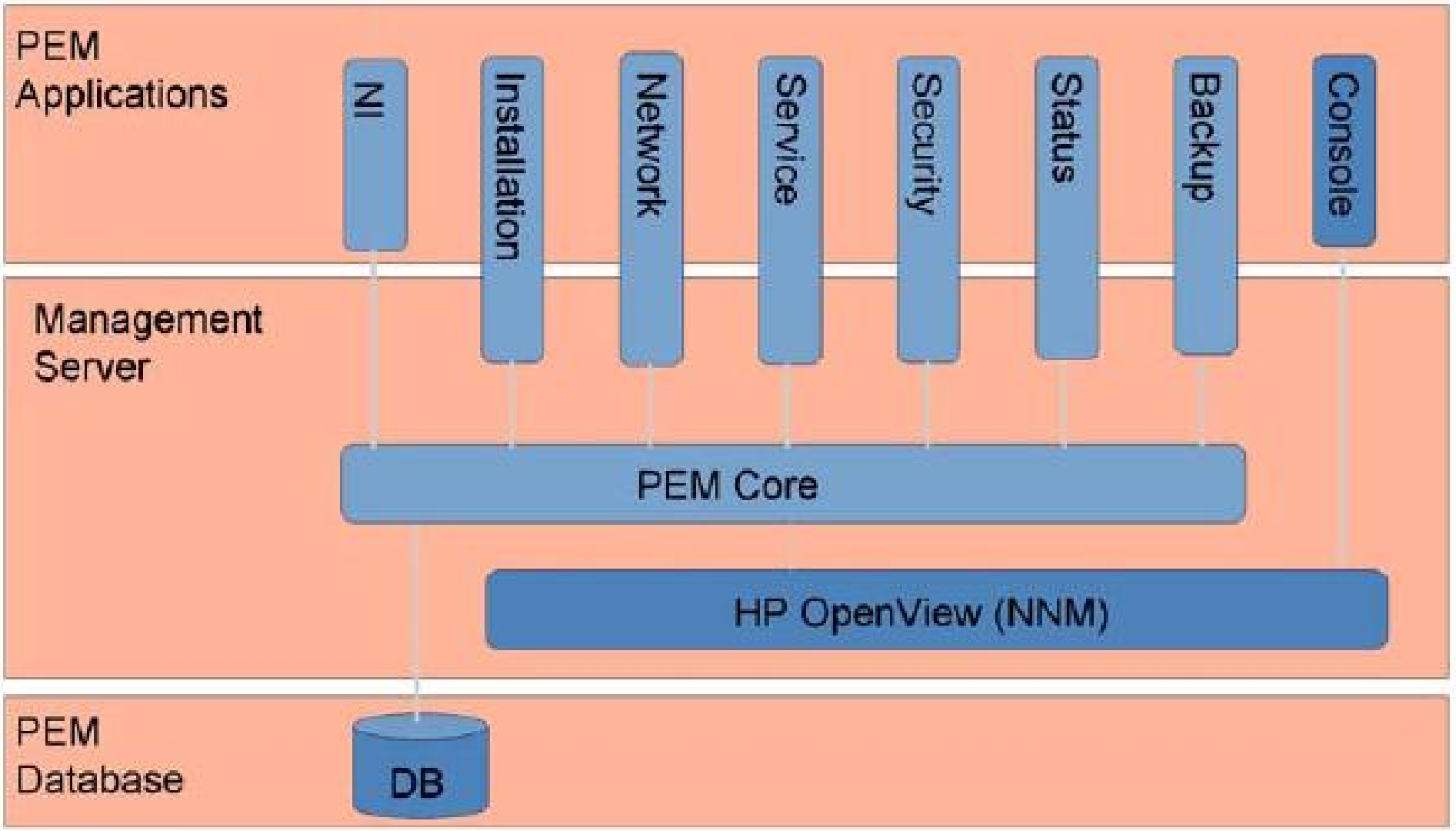
Definition: This system is responsible for management of DSL Access systems through Graphical User Interface (GUI).

Server used in MTNL:

PEM Server on Solaris Platform



PEM Structure



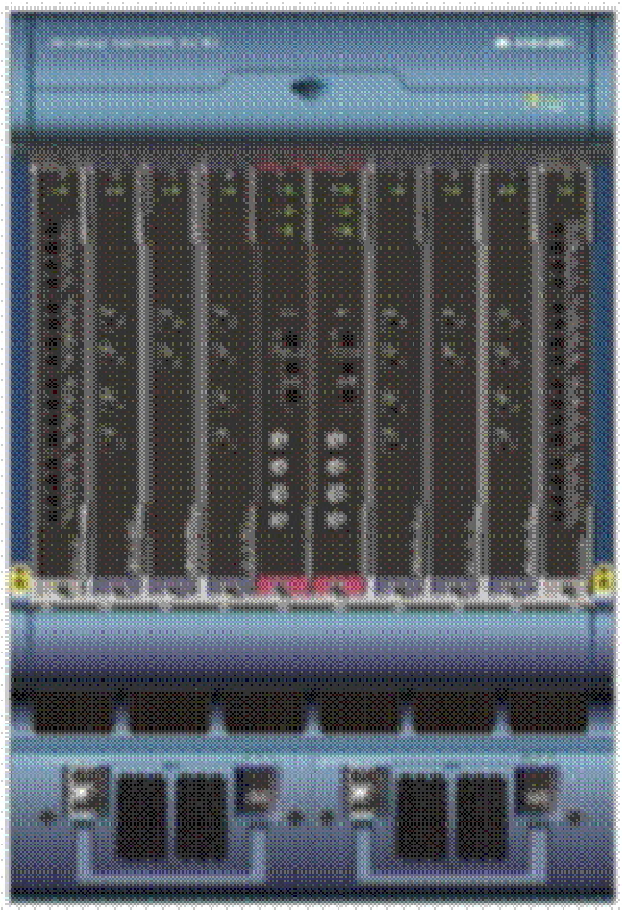
Important Features:

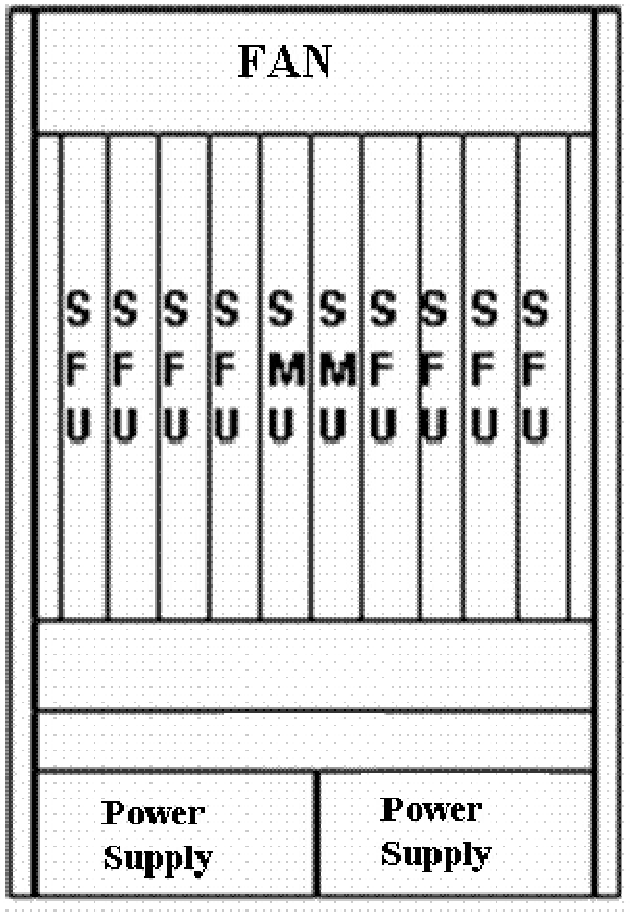
- PEM uses HPoV NNM to provide a graphical network view from which management of the network and subscribers can be performed in the daily operation of the system.
- Service Configuration Manger application is used for handling end-users and their services
- Subscriber line testing, service profile addition and deletion are done through SCM
- Network Configuration Manager application is used for managing DSL Access network elements
- Bulk Configuration Manager is used for provisioning larger number of end users
- Status Manager helps in monitoring network elements
- Back up Manager takes back up of entire PEM system

NETWORK ELEMENTS

NETWORK ELEMENTS	Huawei Product Model	Total Number of Elements
BRAS	MA5200G-8	8
Tier-I	NE80E	8
Tier-II	S6506	64
DSLAM	MA5600	629
EMS Client	iManagerN2000	30

BBRAS MA5200G





HARDWARE DESCRIPTION

The MA5200G provides the -48 V/-60 V DC power input with 1+1 redundancy mode. The power supply has a primary straight-through output and a secondary constant voltage -48V/-60 V DC output.

BBRAS CHARACTERISTICS

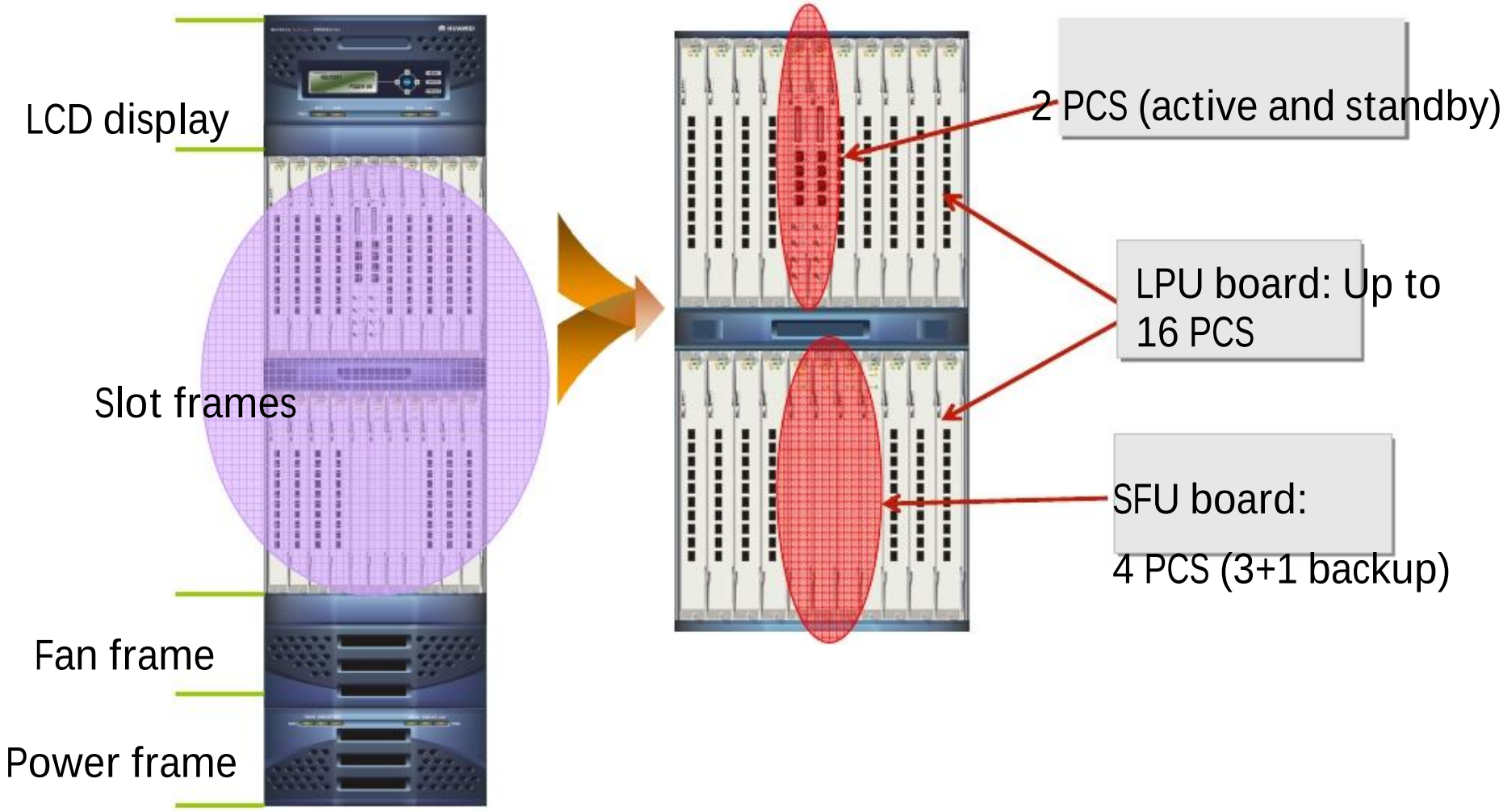
Parameter name	Performance Parameters MA5200G-8
Number of slots	10 slots, 2 for SMUs and 8 for SFUs.
Switching capability of the backplane	256G bit/s
Switching capability of the whole equipment	64G bit/s

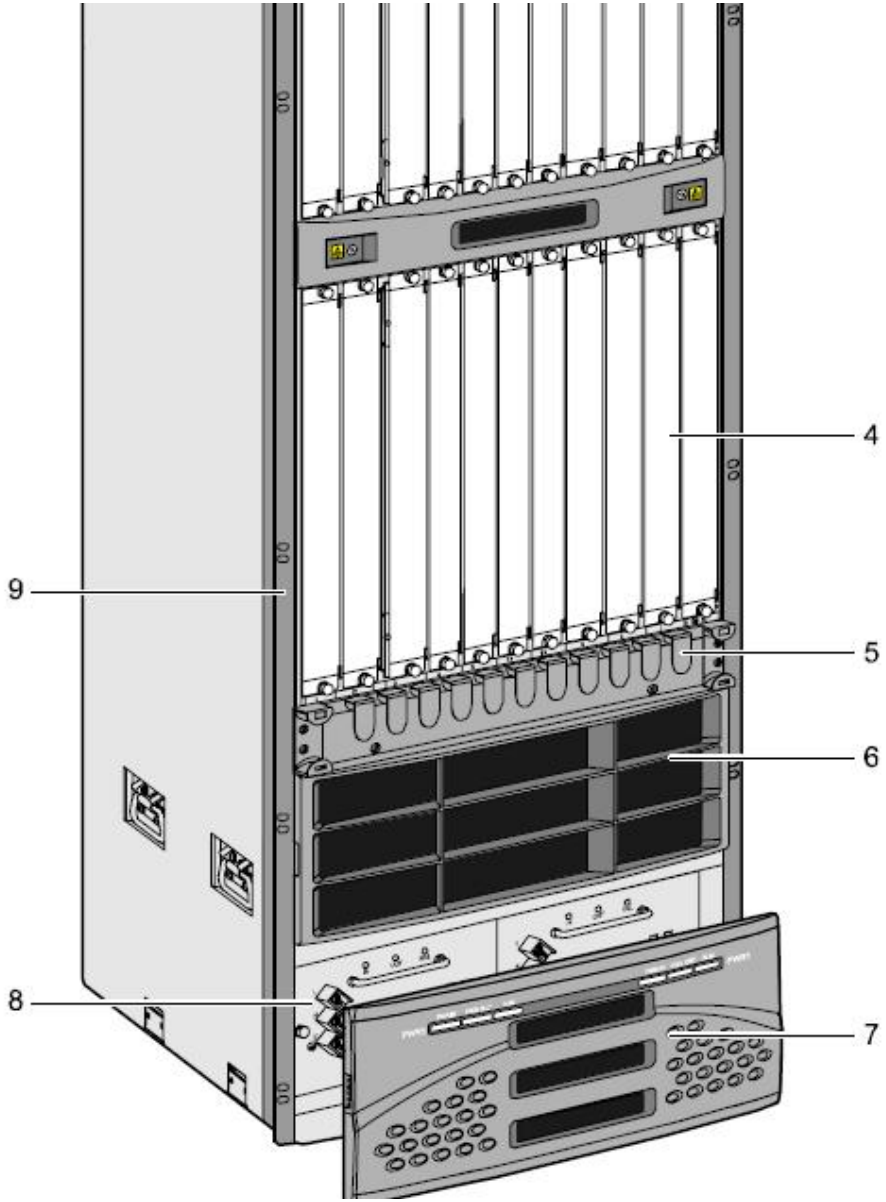
Parameter name	Performance Parameters MA5200G-8
Number of configured users	Up to 32K users per SFU, up to 256K users per MA5200G
Number of concurrent users	Up to 8K users per SFU, up to 48K users per MA5200G.
Forwarding performance	3Mpps per board. & total 48Mpps

Parameter name	Performance Parameters MA5200G-8
Multicast protocol And multicast route	Multicast protocols: PIM-SM, PIM-DM, MBGP, MSDP and IGMP V1/V2. Multicast routes: 10K.
VLAN	4K per FE/GE port, 32K per board, up to 256K per MA5200G
Address pool	4K address pools, 96K addresses.

Parameter name	Performance Parameters MA5200G-8
ACL	5K rules.
UCL	The equipment supports up to 1024 user groups, and each group supports up to 1024 rules.
CAR	The range of CAR control is 8Kbps to 1Gbps. The granularity is 8Kbps. The error rate is less than 5%

T1 Switches NE80E





1. LCD	2. Fan module
4. Board cage	5. cable management bracket
7. Plastic panel of the power supply module	
9. Rack-mounting ear	10. Handle

3. cable management bracket

6. Air intake frame

8. Power supply module

CHARACTERISTICS

Item	Typical configuration
Processor	Dominant frequency: 1GHz
Boot ROM	1 MB
SDRAM	1 GB Can be expanded to 2 GB.
NVRAM	512 KB
Compact Flash	(CF) card 512 MB

ITEM	TYPICAL CONFIGURATION
Switching capacity Interface capacity	640 Gbps 320 Gbps
Maximum interface rate per LPU	2 * 10 Gbit/s
Slots for LPUs	16
Slots for SRUs Slots for SFUs	2 4
Forwarding performance	400Mpps

PHYSICAL PARAMETERS

Component	Description
DC input	Rated voltage –48 V Allowed voltage –72 V to –38 V
AC input	Rated voltage 200V AC to 240V AC, 50/60Hz Allowed voltage 180V AC to 264V AC, 50/60Hz
Environmental temperature	Long-term 0°C to 45°C Short-term –5°C to 55°C Storage –40°C to 70°C

T2 Switches Quidway S6506

S6506 is modularized wire speed Ethernet

switch that operates at layer two/three, at the

distribution layer of IP metropolitan area

networks (MANs) and at the core layer of

small or medium sized enterprise networks

and campus area networks

HARDWARE DESCRIPTION

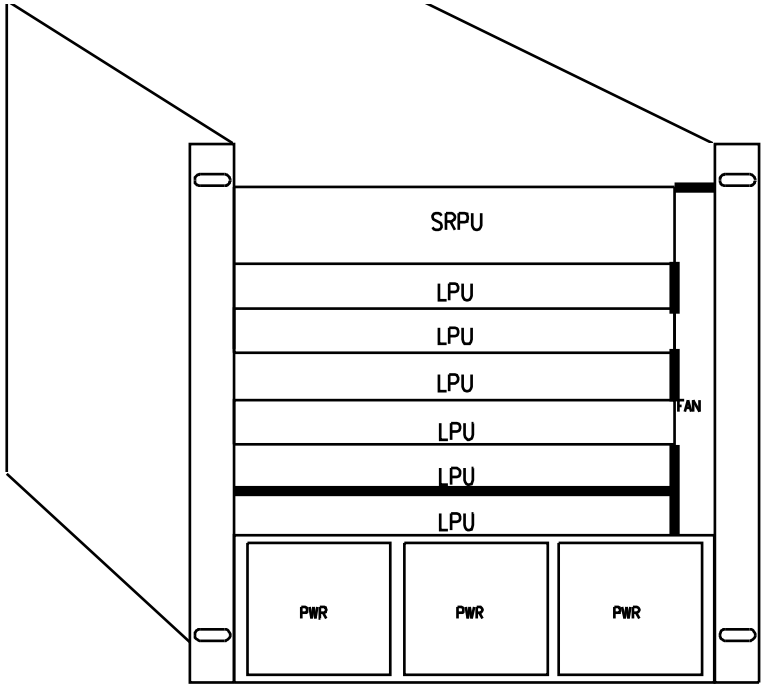
S6506 adopts integrated cabinet structure.

The cabinet is wholly divided into four parts:

- Board area

The board area includes totally 7 board slots, One SRPU slot: Slot 0,6 service board slots

- Fan area
- Power supply area
- Power distribution area

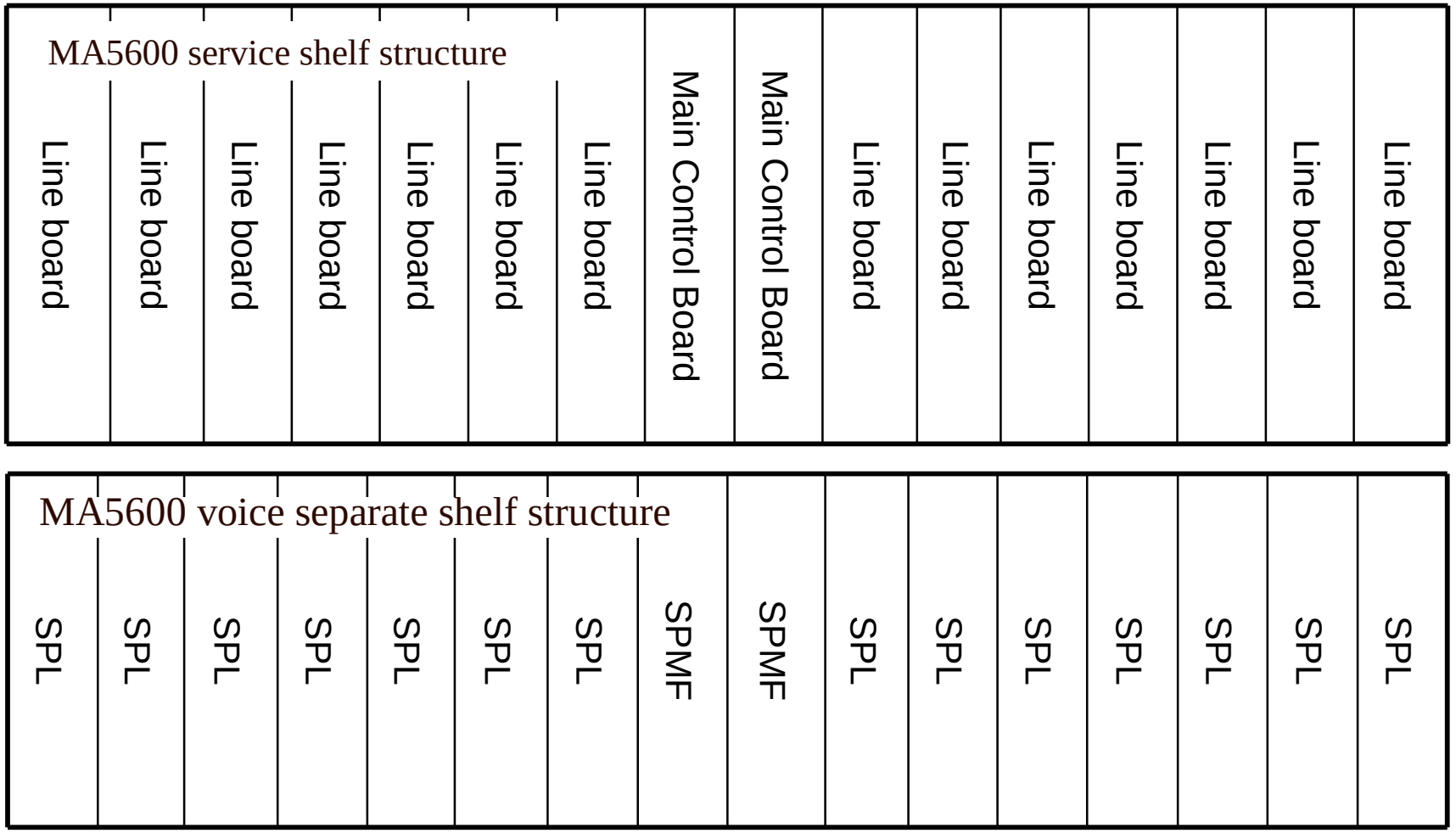


FORWARDING CHARACTERISTICS

Conversion capacity	64Gbit/s
Packet switching rate	48Mpps
Max configuration of GE ports under the wire speed mode	32
Max configuration of FE ports under the wire speed mode	288
Number of VLANs	4K
MAC address table	32K
IP routing table	64K

DSLAM MA5600

SHELF STRUCTURE



MA5600 HARDWARE DESCRIPTION

MA5600 service shelf and voice splitter shelf, total 16 slots, 14 slots are service slots, 2 slots are main control slots

Service shelf:

Slots 7 and 8: system main control board SCU
Slots 0-6 and 9-15: service board, ADEF (ADSL2+)

Voice splitter shelf:

Slots 7-8: main control board SPMF
Slots 0-6 and 9-15: voice splitter board SPLT/SPLQ

APPLICATION OF THE MA5600

The MA5600 is a multi-service access module, which provides abundant access services, such as

- Asymmetrical digital subscriber line 2 plus (ADSL2+)
- Single-line high speed digital subscriber line (SHDSL)
- Very high speed DSL 2 (VDSL2)

Configuration	Maximum Number of Subscribers	Maximum Power Consumption
DC-powered cabinet	896	1780 W

Thanks

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