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IP Msan Management In Algeria

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Informations	Résumé
Mots clés : NGN MSAN Configuration Network *Correspondance : Amina.dinar@univ-mascara.dz	Because of the growing demand for multimedia services, several operators worldwide have begun to deploy NGN architectures. To respond to their customers' needs (offer both broadband and narrowband services in real-time very capricious that require a reliable and stable access infrastructure and low cost). Algeria Telecom and Mascara Provence deploy an MSAN M500T. It enables the transition between the PSTN and the NGN, intending to provide more services that are reliable to the end-user. In our work, we will present the management techniques of this MSAN M500T for the first time. We were able to configure and perform local and remote network operations in the Mascara province, such as Vlan creation, flow increase, and line testing.

1. Introduction

Traditional fixed telephony networks of incumbent operators rely on circuit switching (also known as TDM transmission) between subscriber lines and a hierarchical organization of switches based on different call zones. Furthermore, this telephony network coexists with one or more data transport networks (including the network used to provide DSL broadband services).

The migration of incumbent operators' core fixed networks to NGN (Next Generation Network) is primarily a cost-cutting measure, with the transition to a single IP-based infrastructure for the transport of all flow types, voice or data, and access technologies (DSL, FTTH, PSTN, Wi-Fi, etc.).

The primary impact of adopting an NGN architecture for switched telephone networks is separating the traditional switch into two distinct logical elements: the media gateway for transport and the soft switch for call control.

Theoretically, this evolution allows for gains in terms of performance and cost optimization. Next-generation optical system solutions combine existing optical networks such as DWDM and SDH optical networks. Traditional transport devices now include data and Ethernet functions [1].

New access technologies play a critical role in developing next-generation multimedia IP services to improve service quality. They are distinguished by their maturity level, switching architecture, and high throughput. [1-3].

2. NGN Overview

NGN is defined as a packet-based transport network that enables the convergence of Voice/Data and Fixed/Mobile networks.

These networks will allow the delivery of multimedia services accessible from various access networks.

To adapt to significant trends such as the search for flexibility in network evolution, the distribution of intelligence in the network, and the opening up of the network to third-party services, NGNs are

Based on a gradual evolution towards "all-IP" and are modeled in independent layers that communicate via open and standardized interfaces [3].

2.1 Layered NGN architecture

The transition to an NGN-type architecture is distinguished by the separation of physical switching and call control tasks. The NGN architecture employs a layered model that divides the functions and equipment in charge of traffic

transport and control. An architectural model can be defined using four successive layers.

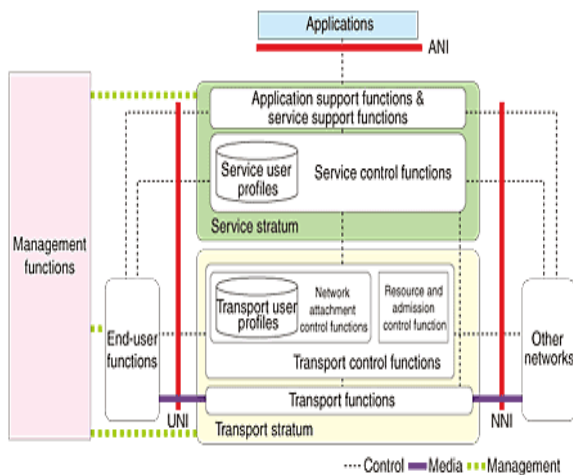


Fig.1 : General architecture of an NGN [3]

3. MSAN in NGN Rôle

There was a separation between voice and data flows before deploying the MSAN in fixed networks; the MSAN is a powerful solution that replaces a DSLAM for data services and an AXE for voice services. It includes POTS, Ethernet, xDSL, and FTTx cards to provide converged technology over IP, with features such as encoding and packetizing media streams from the access network to the packet network and vice versa, i.e., traffic conversion, such as TDM/IP [2].

According to the Media Gateway Controller, Supports H.248, MGCnd SIP protocols also support real-time transport protocol RTP/RTCP and Ethernet and Supports PSTN, ISDN, FAX, V5 interface, xDSL, and GPON services.

4. NGN advantages

This new topology has the following benefits:

- The operator now has a multiservice network that can interface with any access thanks to NGN (local loop, PBX, telephone access switch, ADSL access, GSM or UMTS mobile access, IP telephone, etc.).
- The operator will only be required to run a single multiservice network.
- It uses IP or ATM transport, ignoring the limitations of TDM (Time Division Multiplexing) networks at 64 kbit/s. TDM loses efficiency when asymmetric, sporadic, or variable bit rate services are introduced.
- It is an open topology capable of transporting both telephone and multimedia services (video, real-time data).

- It separates the network's support and control components, allowing them to evolve independently and breaking the monolithic communication structure. The transport layer can be changed without affecting the control or application layers.

It uses open interfaces between all elements, allowing the operator to purchase the best products for each segment of his network [10].

5. MSAN Advantages

MSANs are a natural progression from DSLAMs. An MSAN is a piece of equipment that serves as a single point of access to the operators' access networks in most NGN architectures.

The access layer groups together the functions and equipment used to manage user equipment's network access, depending on the access technology (switched telephony, DSL, cable). This layer contains, for example, DSLAM equipment that provides DSL access. (6–7)

The transport layer, which, depending on the protocol, is in charge of routing voice or data traffic in the core network. At this level of an NGN architecture, the Media Gateway (MGW) is responsible for adapting transport protocols to the various types of physical networks available (PSTN, IP, ATM) [8].

The control layer oversees all service control functions in general and calls control in particular for voice services. At this level of an NGN architecture, an essential piece of equipment is the call server, also known as a "softswitch", which provides the equivalent of an NGN's switching function in voice services. The software switch functionalities and interfaces are standardized in the IMS standard defined by 3GPP, and the equipment is referred to as CSCF (Call Session Control Function) [3].

The layer's equipment consists of two types: application servers and enablers, which are functionalities, such as the management of user presence information, that multiple applications can use. Because SIP (Session Initiation Protocol) is used in an NGN architecture to manage multimedia sessions in general and voice over IP services in particular, this layer typically includes SIP application servers.

These layers are self-contained and communicate with one another via open interfaces. This layered structure is intended to increase flexibility and efficiency in the implementation of new services. The use of available interfaces not only facilitates the integration of new services developed on an operator network, but it is also necessary to ensure the interconnection of an NGN network with other

networks, whether NGN or traditional.

The most significant impact on traditional switched telephone networks is separating the standard switch into two distinct logical elements: the media gateway for transport and the soft switch for call control [4]. Once the telephone communications are "packaged" by the media gateway, the services are no longer dependent on the physical characteristics of the network. For operators, a single packet network core shared by multiple access networks is an appealing prospect. In many cases, a shared IP/MPLS core at the NGN's transport layer is chosen to provide sufficient QoS mechanisms to ensure adequate service delivery [5].

The MSAN provides the operator with a multiservice network that allows it to interface with any access. The operator will only be required to run one multiservice network. It employs transport methods such as IP or ATM while ignoring the limitations of TDM networks. It serves as a single point of contact for all network-related inquiries and offers a bandwidth solution as well as managed access. Basic PSTN services are being migrated to an IP platform.

The customer will have, on his simple fixed-line, telephone, ADSL, and possibly Television, Tele purchase, etc., at his convenience and request, without burdening him with equipment (ex: modem, interface, etc.) [8].

It provides subscribers with more personalized and higher-quality services. It provides companies with innovative services and intelligent networks, whose security and storage capabilities will allow for better networking and information system integration.

It is capable of delivering secure, high-performance, and widely accessible voice and data services. Billing systems will be simplified and will account for all services provided to subscribers. For the same price as his previous network, the subscriber now has four times the bandwidth. MSAN provides the following services:

MSAN supports two types of services: broadband services such as Triple Play, IPTV, and xDSL, and narrowband services below 4 kHz such as POTS, ISDN, and FAX [7].

5.1. Triple Play service

Triple Play service enables the simultaneous integration of three services: Internet access, IPTV, and Voice over IP in a single channel to increase broadband throughput.

5.2. xDSL service

xDSL is the evolution of a group of technologies that enable broadband transmission over twisted telephone pairs. It has a bandwidth of 1 Mhz and uses more carrier frequencies for data. Among the most widely used xDSL technologies is (ADSL, SHDSL, VDSL).

5.3. IPTV service

IPTV is a new service that allows for delivering real-time programs such as broadcasting and video on demand. This service ensures high quality across a wide range of frequencies. This service is built on the multicast mechanism, which allows multiple target machines on the network to receive the same frame (point-to-multipoint transmission) [3, 6].

6. The functional entities of the NGN core network

6.1 The Media Gateway (MG)

The Media Gateway is located at the level of media flow transport between the PSTN network and packet networks or between the NGN core network and access networks. Its function is to:

- Encoding and packetizing the PSTN media stream and vice versa (TDM/IP traffic conversion).
- The transmission of media flows is received from both sides by the instructions of the Media Gateway Controller.

6.2 Signalling Gateway (SG)

The Signalling Gateway's role is to convert the signaling exchanged between the NGN and the interconnected external network into a format understandable by the equipment in charge of processing it, but without interpreting it (this role being assigned to the Media Gateway Controller). It adapts the signaling to the transport protocol particularly (e.g., TDM/IP adaptation) [3].

6.3 The call server or Media Gateway Controller (MGC) or soft switch

The MGC is the "intelligence" in an NGN network. It is in charge of the exchange of signaling messages sent from one side to the other via signaling gateways and the interpretation of this signaling. Call processing entails interacting with H.323, SIP, or MGCP terminals and communicating with application servers to provide services. [2].

7. Functional architecture of the MSAN MA5600T

7.1. Services interface module

This module contains all of the Access interfaces ports for the various voice and data services,

including ADSL2+ Access Interface; Access interface for SHDSL; Access interface for VDSL2; P2P FE optical access interface; Access interface for GPON; Access interface for POTS (VOIP); Module for Ethernet switching.

The collection and switching of Ethernet packets are possible with this switching module; This entity is associated with the SCU control card.

7.1.1. Control module for services

This service control unit is made up of the SCU control card and other sub-cards, and it performs the following tasks:

- Maintain control over broadband services
- Maintain serial and network ports to facilitate system maintenance using a terminal or a network management station.

7.1.2. Voice packet-processing module (VOIP)

A VoIP packet routing and management module.

7.1.3. NIM stands for Network Interface Module

This module contains all of the network layer interface ports of the MA5600T equipment FE optical port (electrical) GE optical port (electrical) E1 ports [7].

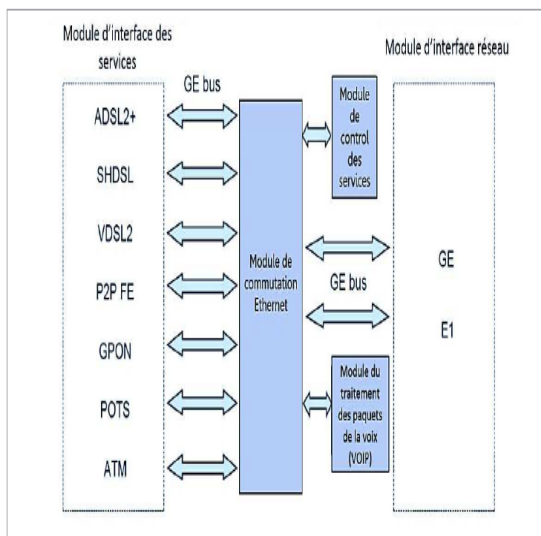


Fig. 2 :
Functional
architecture of
the MSAN
MA5600 [6]

8. Configuration and test operations

We were able to perform some configuration operations on the 'Froha' and 'Ghellal Zine Abidine' sites at the Mascara city.

8.1. Configuration 'Froha' Site

We were able to create two types of vlans using this script: smart for data connection and standard for management operations. Each vlan is assigned a board number ranging from 1 to 18.

UA5000:

```
port vlan 10 0/2 1
port vlan 510 0/2 1
port vlan 810 0/2 1
```

600K:

```
sysname M_29_FROHA_600K
display board 0
vlan 510 smart
vlan 810 smart
vlan 10 standard
port vlan 510 0/9 0
port vlan 810 0/9 0
port vlan 10 0/9 0
inter vlanif 10 : ip address 172.18.29.246 24
ip route-static 0.0.0.0 0.0.0.0 172.18.29.1
ip route-static 172.20.50.8 255.255.255.248 172.21.29.1
description To-U2000-standby
ip route-static 192.168.116.0 255.255.255.248 172.21.29.1
description To-U2000-Active
SNMP (management - BMS)
snmp-agent community read public
snmp-agent community write private
snmp-agent trap enable standard
snmp-agent target-host trap-hostname BMS-ORAN address
192.168.131.2 trap-paramsname BMS
snmp-agent target-host trap-hostname BMS-ALGER address
192.168.116.2 trap-paramsname BMS
snmp-agent target-host trap-hostname BMS-ALGER2 address
192.168.116.3 trap-paramsname BMS
snmp-agent target-host trap-hostname BMS-MASCARA
address 192.168.129.2 trap-paramsname BMS
snmp-agent trap source vlanif 10
```

```
=====
DELETE VLAN 101: 1- undo service-port all      2- undo port
vlan 101 0/9 0      3- undo vlan 101
///// inter vlan 10 / 1060
```

8.2. Flow increase of Ghellal Zine Abidine site

The flow increases from 2 to 20 Mbit/s, or we associate the appropriate profile to the port; in this script, we activated port 34 to increase the flow.

Integrated Access Software (MA5600T).

User last login information:

```
Access Type : Telnet
IP-Address : 192.168.116.4
Login Time : 2021-03-25 10:02:48+01:00
Logout Time : 2021-03-25 10:15:34+01:00
```

29_M_Ghellal_Zine_Abidine_1000_I_B> Warning: Using the default user password is not recommended. Please change the password.

```
29_M_Ghellal_Zine_Abidine_1000_I_B>enable
29_M_Ghellal_Zine_Abidine_1000_I_B#config
29_M_Ghellal_Zine_Abidine_1000_I_B(config)#display
mgpstnuser 0 34
```

```
{ <cr>|span-area<U><1,10000 >:
```

```
Command:
display mgpstnuser 0 34
```

```
-----
F /S /P MGID TelNo Priority PotsLineType
TerminalID
```

```

0 /1/34      0    - Cat3  DEL      A34
-----
29_M_Ghellal_Zine_Abidine_1000_I_B(config)#interface
adsl 0/1
29_M_Ghellal_Zine_Abidine_1000_I_B(config-if-adsl-0/1)
#display port state 34
-----
Port      Status      Line_Profile  Alm_Profile  Ext_Profile
-----
34      Activating      2          1          --
-----
29_M_Ghellal_Zine_Abidine_1000_I_B(config-if-adsl-0/1)
#Deactivate 34
29_M_Ghellal_Zine_Abidine_1000_I_B(config-if-adsl-0/1)
#Deactivate port 34 successfully
29_M_Ghellal_Zine_Abidine_1000_I_B(config-if-adsl-0/1)
#Activate 34 profile-index 1002
29_M_Ghellal_Zine_Abidine_1000_I_B(config-if-adsl-0/1)
#Send the command to activate port 34 successfully
29_M_Ghellal_Zine_Abidine_1000_I_B(config-if-adsl-0/1)
#Display port state 34
-----
Port      Status      Line_Profile  Alm_Profile  Ext_Profile
-----
34      Activating      1002        1          --
-----
29_M_Ghellal_Zine_Abidine_1000_I_B(config-if-adsl-0/1)#

```

8.2.1. Vlan

This script is a network management supervisory between the equipment and the server. U2000 displays the types of vlans 111 standard for voice management and valn 10 for data and smart, which are assigned for data connection.

```

29_M_Ghellal_Zine_Abidine_1000_I_B(config)#
-----
Huawei Integrated Access Software (MA5600T).
-----
User last login information:
-----
Access Type : Telnet
IP-Address : 192.168.116.4
-----
29_M_Ghellal_Zine_Abidine_1000_I_B>
Warning: Using the default user password is not
recommended. Please change the password.
29_M_Ghellal_Zine_Abidine_1000_I_B>enable
29_M_Ghellal_Zine_Abidine_1000_I_B#config
29_M_Ghellal_Zine_Abidine_1000_I_B(config)#display vlan
all
{ <cr>|vlanattr<K>|vlantype<E><=>mux,standard,smart,super>
};
Command:
display vlan all
-----
VLAN Type Attribute STND-Port NUM SERV-Port NUM
VLAN-Con NUM
-----
1 smart common 4 0 -
10 standard common 1 0 -
111 standard common 1 0 -
1022 smart common 1 1 -
1065 smart common 1 1 -
3142 smart stacking 1 780 -
3180 smart common 1 1 -
-----
Total: 7
Note : STND-Port--standard port, SERV-Port--service virtual
port,
VLAN-Con--vlan-connect
29_M_Ghellal_Zine_Abidine_1000_I_B(config)#vlan ?

```

```

-----
Command of config Mode:
-----
attrib      VLAN attribute
bind        Bind
forwarding   Set VLAN forwarding mode
loop        VLAN loop
name        VLAN name
packet-policy Set VLAN packet forwarding policy
priority     VLAN priority
reserve      The reserved VLAN ID
service-profile VLAN service profile
vlan-list<S><Length 1-255>
              VLAN list(2,5-8,10)
vlanid<U><2,4093> VLAN ID
-----
Command of privilege Mode:
-----
desc        Description Operation

```

8.3. Ping of remote site 'Ghriss'

This operation consists in determining whether or not a remote site is operational, that is, whether or not the consulted connectivity by integrating its address IP reveals that 5 packet(s) were transmitted, 5 packet(s) were received, and 0.00 percent were packet lost.

Huawei Integrated Access Software (MA5600T).

```

-----
User last login information:
-----
Access Type : Telnet
IP-Address : 192.168.116.4
Login Time : 2021-04-07 10:21:54+01:00
Logout Time : 2021-04-07 10:31:14+01:00
-----
29_M_110_Logts_Ghriss_1000_I_B>
Warning: Using the default user password is not
recommended. Please change the password.
-----
<cr>      Please press ENTER to execute command
-----
29_M_110_Logts_Ghriss_1000_I_B(config)#ping 172 ?
-----
Command of privilege Mode:
-----
<cr>      Please press ENTER to execute command
-----
29_M_110_Logts_Ghriss_1000_I_B(config)#ping 172.18.29.9
PING 172.18.29.9: 56 data bytes, press CTRL_C to break
Reply from 172.18.29.9: bytes=56 Sequence=1 ttl=254
time=17 ms
Reply from 172.18.29.9: bytes=56 Sequence=2 ttl=254 time=6
ms
Reply from 172.18.29.9: bytes=56 Sequence=3 ttl=254 time=6
ms
Reply from 172.18.29.9: bytes=56 Sequence=4 ttl=254 time=6
ms
Reply from 172.18.29.9: bytes=56 Sequence=5 ttl=254 time=6
ms
--- 172.18.29.9 ping statistics ---
5 packet(s) transmitted
5 packet(s) received
0.00% packet loss
round-trip min/avg/max = 6/8/17 ms
29_M_110_Logts_Ghriss_1000_I_B(config)

```

9. Conclusion

Several operators worldwide have begun to deploy

NGN architectures that allow them to meet their customers' needs (offering highly capricious real-time broadband and narrowband services that require a reliable, stable, and low-cost access infrastructure) [11].

The research conducted during this project enabled us to demonstrate the importance of implementing the Multi-Service Access Node MSAN by presenting the HUAWEI MA5600 solutions and the services they provide to meet the demand of subscribers for a higher quality of connection. As an extension of this work, we proposed securing the connection server under Linux with a Fortinet firewall to protect it from various attacks.

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