

# Integrated hardware/software in the Algeria Telecom access layers NGN model:MA5600T and C300M Shelves MSAN solutions

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**Abstract**—The evolution of an existing network to the new structure will require a phased migration strategy aimed at minimising capital expenditure during the transition phase, while reaping the benefits early on. Any action taken during this transition step should simplify the network's evolution to the NGN packet-switched architecture. This paper presents the development of PSTN networks into NGN Optical Fiber, its configuration and implementation of Smart AX MA5600T HUAWEI and C300M ZTE Shelves MSANs solutions.

The fixed access network plays an increasingly important role in terms of investment, revenue and number of subscribers in the telecommunications systems landscape. The growing demand for bandwidth-intensive services has attracted the attention of operators by encouraging them to review their network architecture and migrate to an IP-based Next Generation Network (NGN) model for the transport of all types of traffic [1–2].

Since it was impossible to create this network overnight, Algeria Telecom followed the best scenario in order to create it in accordance with standards, starting with the upper layers (service management, control, transport) with the implementation of Soft switch and Medias Gateway, then moving down to the transport layer, with the implementation of the routers that constitute the IP/MPLS backbone. Thus, the implementation of the RMS (Multiservice Network) has made it possible to ensure easy integration of existing networks and gives the possibility of offering new services to customers.

In the context of this migration, the implementation of MSAN Multi-Service Access Node (MSAN cabinet consists of narrowband (POTS), broadband (xDSL) services, batteries with rectifiers, optical transmission unit and copper distribution) at an access network level is the optimal solution to meet the demand for services and to guarantee the existing services with a better signal quality. Multi-Service Access Node (MSAN) is a type of FTTN network, where fibers are connected to an existing node which is serving users with a copper pair but below the required bandwidth [1, 4].

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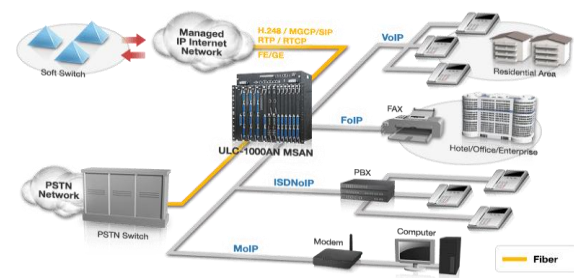


Fig. 1. Multi-Service Access Node Solution [2].

This article is a practical study that presents the commissioning and configuration of the two MSANs installed in Algeria Smart AX MA5600T and C300M.

Algeria Telecom has decided to improve and develop its fixed network through the implementation of the MSAN solution. It enables the transition between the RTC and the NGN, the aim of which is to offer more reliable services to the end user.

MSAN is the access node in NGN networks, it can provide multiple voice and data services simultaneously with high capacity and reliability [3, 5–6].

Before the deployment of MSAN in fixed networks, there was a separation between voice and data flow, MSAN is a powerful solution that replaces DSLAM for data services and AXIS for voice services. It includes POTS, Ethernet, xDSL and FTTx cards to provide converged technology over IP, among these features [4] are:

- The coding and media packaging stream received from the access network to the packet network and vice versa, in other words, the conversion of traffic, for example TDM/IP,
- Media Transmission flows according to the instructions of the Media Gateway Controller,
- Supports H.248, MGCP and SIP protocols,
- Supports real time transport protocol RTP/RTCP,
- Supports G.711, G.729, G.723.1 audio codecs,
- Supports high speed interfaces: ADSL/ADSL2+, VDSL2, SHDSL, GPON and Ethernet,
- Supports PSTN, ISDN, FAX, V5 interface, xDSL and GPON services.

The practical part focuses on different steps of commissioning and configuration of the Smart AX MA5600T and C300M Shelves MSAN. After hardware installation and distribution cabling of an MSAN indoor site, the next step is designed for the commissioning and configuration of broadband and narrowband services. There are two configuration modes [3, 5–6, 9]:

- Configuration via the console port: The console port located in the MSAN control board is used when commissioning or configuring the MSAN locally.

- Telnet configuration (via Ethernet port): In this mode, an Ethernet cable is used to configure the MSAN connected to the Eth port of the control board, the Ethernet cable is used to configure or manage the equipment locally and remotely. The maintenance terminal IP address must be configured and in the same subnetwork as the MSAN M-Eth address.

After ensuring the connection between the terminal and our MSAN, it is necessary to use a terminal emulator on which the configuration commands are entered, there are several emulators for this function (e.g. TERATERM) just configure the MSAN Eth IP address, port and access mode (Telnet or SSH).

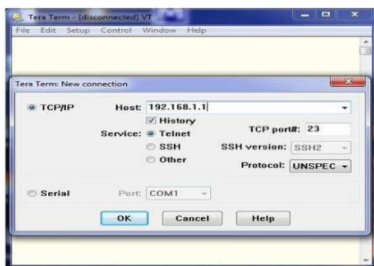


Fig. 2. Telnet Configuration Via TERATERM.

In this section, we will show how to configure the chassis and the different boards of Smart AX MA5600T and C300M [5, 9].

The configuration of the cards is done in two possible ways: Auto-configuration - this configuration method is generally used during commissioning, using the following commands (Table 1), the type of cards inserted will be detected automatically;

Table 1. Auto cards configuration

MSAN Smart AX MA5600T	MSAN C300M
huawei(config)# boardconfirm 0	ZXAN(config)#set-pnpenable

Manual configuration, where to add a card to a slot, you can use the following commands (Table 2):

Table 2. Manual cards configuration

MSAN Smart AX MA5600T	MSAN C300M
huawei(config)#board add 0/2 h802gpbd 0 frame 2 slot board added successfully huawei(config)#display board 0/2	ZXAN(config)#add-card rack no 1 shelfno 1 slotno 4 VSWEC ZXAN(config)#exit

Board Name:H802GPBD BoardStatus: Failed	
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VLAN's declaration, assignment and Management: In this part, we will show how to declare a VLAN and how to assign it to a port (Table 3).

Table 3. VLAN's Declaration, Assignment and Management

MSAN Smart AX MA5600T	MSAN C300M
huawei (config)#vlan 50 smart	ZXAN(config)#vlan 1000 ZXAN(config-vlan)#exit
huawei(config)#port vlan 20 0/9 0 huawei(config)#port vlan 21 0/9 0	ZXAN(config)#interface gei_1/21/1 ZXAN(config-if)#switchport mode hybrid ZXAN(config-if)# switch port vlan 20 tag ZXAN(config-if)# switch port vlan 21 tag ZXAN (config-if)#exit
huawei(config)#vlan 10 standard huawei(config)#port vlan 10 0/10 1 huawei(config)#interface vlanif 10 huawei(config-if-vlanif 10) # ip address 172.28.1.43 255.255.255.0 description MSAN-Management	ZXAN(config)#vlan 3 ZXAN(config-vlan)#description MNG ZXAN(config)#interface mng1 ZXAN(config-if)#ip address 136.1.1.100 255.255.0.0

SNMP protocol configuration: In this step we will quote the essential commands to configure the SNMP management protocol [4]:

1. Define the initial parameters, namely, the version and the authorization to read or modify the data (Table 4).

Table 4. Define the initial SNMP parameters

MSAN Smart AX MA5600T	MSAN C300M
huawei(config)#snmp-agent community read name1 huawei(config)#snmp-agent community write name2 huawei(config)#snmp-agent sys- info version v2c	ZXAN(config)#snmp-server Community private view all view rw

2. Identify the target host address that is configured to receive the sent messages (Table 5).

Table 5. Target Host Address

MSAN Smart AX MA5600T	MSAN C300M
huawei(config)#snmp-agent target-host trap-hostname U2000_Active address 192.168.103.20 trap-params name u2000	ZXAN(config)#snmp-server host 192.168.103.20 trap version 2c public enable notifications isnms server server-index 1 udp-port 162

3. Packets Monitor sent to the NMS server so that they are checked when the alarm is reported (Table 6).

Table 6. Package Supervision

MSAN Smart AX MA5600T	MSAN C300M
huawei(config)#snmp-agent trap enable standard	ZXAN(config)#snmp-server enabletrap SNMP

ADSL2+ service configuration: in this section we propose to configure the ADSL 2+ service in both Smart AX MA5600T and C300M, for this, we will mention the main steps of this configuration:

1. Creating VLANs: this step consists in creating a smart VLAN for the ADSL 2+ services (Table 7).

Table 7. VLAN ADSL +2 services

MSAN Smart AX MA5600T	MSAN C300M
huawei(config)#vlan 50 smart	ZXAN (config)#vlan 1000 ZXAN (config-vlan)#exit

2. Uplink ports Configurations: in this step, we will configure the ports of the GE interfaces and then associate a VLAN to each port (Table 8).

Table 8. Uplink Ports Configurations

MSAN Smart AX MA5600T	MSAN C300M
huawei(config)#port vlan 50 0/19 0	ZXAN(config)#interface gei_1/21/1
huawei(config)#port vlan 50 0/19 1	ZXAN(config-if)#switchport mode hybrid
huawei(config)#link-aggregation 0/19 0 0/19 1 egress ingress work model acp-static	ZXAN(config-if)#switchport vlan 1000 tag ZXAN(config-if)#exit

3. ADSL 2 + models' creation: In most cases these models are configured by default, which neglects the passage through this step.

A template is the combination of a "channel-profile" that specifies the subscriber's flow rate and a "line-profile". The profile of a subscriber line is defined by a template that describes the different parameters of this line (ADSL, VDSL, Data Rate, Transmission Type, Signal-To-Noise ratio, etc.).

It should be noted that when adding a model, the model index must be defined, otherwise the system automatically assigns an index.

4. ADSL 2+ configuration port interface: this step consists in configuring the ADSL 2+ port interface card and the slot in the MSAN (Table 9).

Table 9. Configuration of an ADSL 2+ port interface

MSAN Smart AX MA5600T	MSAN C300M
huawei(config)#interface adsl 0 / 4	ZXAN(config)#interface adsl_ 1 / 4 / 1-64

5. Adding VPI and VCI: Creation of FAI tunnel corresponding to our MSAN (Table 10).

Table 10. Tunnel FAI with VPI and VCI ports

MSAN Smart AX MA5600T	MSAN C300M
multi-service-port vlan 103 board 1-18 vpi 0 vci 38 rx-ctrl 6 tx-ctrl 6	atm pvc 1 vpi 0 vci 38 switchport default vlan 1115 pvc 1

Configuration of the VoIP voice service based on the SIP protocol: we have chosen as an example to configure the SIP protocol or we will try to summarize the main steps of configuration according to (Smart AX MA5600T and C300M) (Table 11) [7].

Table 11. VoIP based on the SIP protocol

MSAN Smart AX MA5600T	MSAN C300M
huawei(config)#voip huawei(config-voip)#ipaddress media 10.50.1.10 10.50.1.1 huawei(config-voip)#ip address signaling 10.50.1.10 huawei(config)#ip route-static 10.10.1.0 255.255.0.0 10.50.1.1 huawei(config)#interface sip 0 Are you sure to add the SIP interface?(y/n)[n]:y huawei(config-if-sip-0)#if-sip attribute basic media-ip 10.50.1.10 signal-ip 10.50.1.10 signal-port 5555 transfer udp primary-proxy-ip1 10.10.1.1 primary proxy port 5555 secondary- proxy-ip1 10.10.1.2 secondary- proxy-port 5555 home domain MA5600T/MA5603T/MA5608T.com sip profile-index 0	ZXAN(config-msag)#voip interface add ctrl-ip 10.63.198.227 ctrl-mask 255.255.255.0 media-ip 10.63.198.227 media-mask 255.255.255.0 mgid 1 ZXAN(config)#ip route 10.61.198.0 255.255.255.0 10.63.198.254 ZXAN(config-msag)#sip user add 3 1 begin-index 1 num 64 +8659167050110 digit map name SIPDM password 123456 auth Username 111670501 begin- no 10 digitlen 2 type 3 ZXAN(config-msag)#sip proxy-server add 1 5060 10.61.198.200 ZXAN(config-msag)#sip user-agent add 1 1 port 5060 domname 10.61.198.200

In conclusion, as part of the increasingly urgent need for multimedia services, several operators around the world have begun to deploy NGN architectures that meet the needs of their customers. The gold study of this project allowed us to show the importance of the implementation of the MSAN Multi-Service Access Node through the presentation of the two solutions HUAWEI and ZTE as well as the services that offer them to meet the demand of subscribers with a better signal quality. We proposed as a perspective of this work, to integrate IPv6 and ensure the optimization of routing with genetic networks, and IP-MSAN outdoor solution near customers (in order to minimize fiber costs as well as those for a twisted cable).

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