

NetGen Communications, Inc.

## VLAN Configuration Guide

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## Amendment Records

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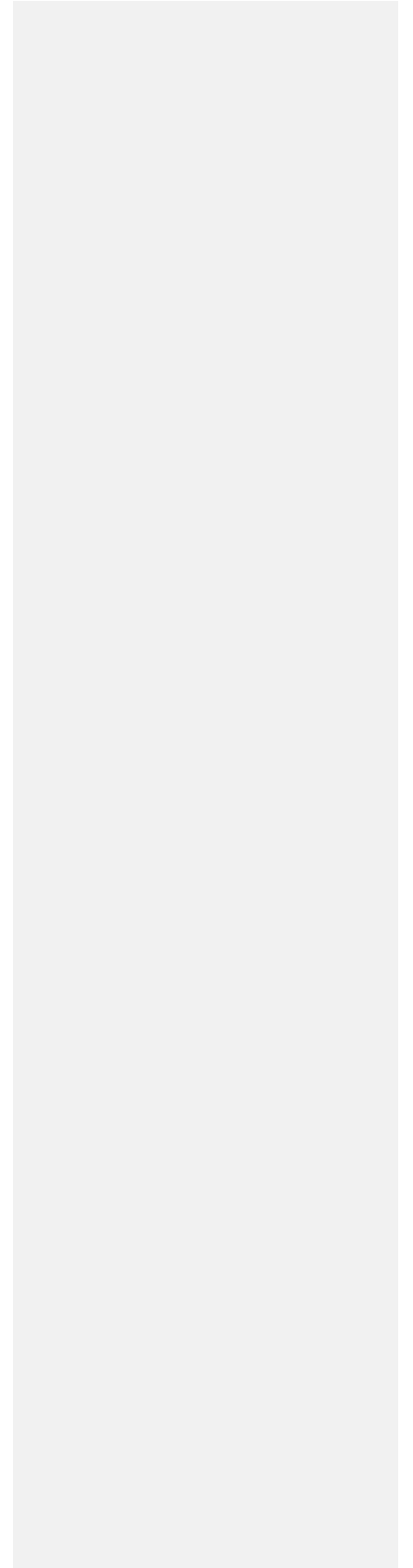
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# 1 Functionality

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## 1.1 Overview

Virtual Local Area Network (VLAN) is a type of communication technology that virtually divides a physical LAN/layer-2 network into multiple broadcast domains. Only hosts in the same VLAN can directly communicate without a router, so broadcast packets are restricted to the same VLAN, improving bandwidth utilization by, for example, segregating VoIP traffic, improving network security (e.g, a guest-only VLAN or finance-only VLAN). . VLAN technology identifies the VLAN information of a data packet by adding the VLAN tag field in the Ethernet frame header.

When a gateway accesses a VLAN, configurations such as VLAN tags and priorities are required for the gateway. The following methods are used for configuring VLANs:

- Manual configuration via a web-based GUI, requiring a restart after the configuration.
- Automatic configuration: With Link Layer Discovery Protocol (LLDP) enabled, during startup Smart ATA automatically obtains VLAN configuration information via an LLDP message, starts the VLAN, and obtains network information, such as its IP address, using the DHCP mode.

Smart ATA supports ~~two-three~~ VLAN modes: single VLANs mode and ~~two~~ multiservice VLANs modes (including voice and management VLANs).

In single-VLAN mode, all device services belong to the same VLAN.

In multiservice VLAN mode, voice service (SIP signaling and RTP media stream) and management service (HTTP, Telnet, TR069, and SNMP) belongs to different VLANs. ~~Manual mode is used to configure single and multiservice VLANs. Automatic mode can configure only single VLANs.~~

The different between two different multiservice VLAN modes:

- Mode 1 - Signaling (SIP) and media stream (RTP/T.38) are on the same VLAN
- Mode 2 - Signaling (SIP) and media stream (RTP/T.38) are on different VLANs

The following example uses the Smart ATA user interface (UI) to demonstrate how to manually configure VLANs with specific configurations and descriptions.



Note

- A restart is required to enable the VLAN configuration take effect.
- After a VLAN is configured, only PCs in the same VLAN can access the device.
- Smart ATA's IP address used to log in to the GUI can be obtained by connecting a phone to an FXS port and dialing "##". In the case of a single VLAN, the IP address of the single VLAN is voiced

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## VLAN Auto Configuration via LLDP

by the device; in the case of a multiservice VLAN, the IP address of the management VLAN is voiced.

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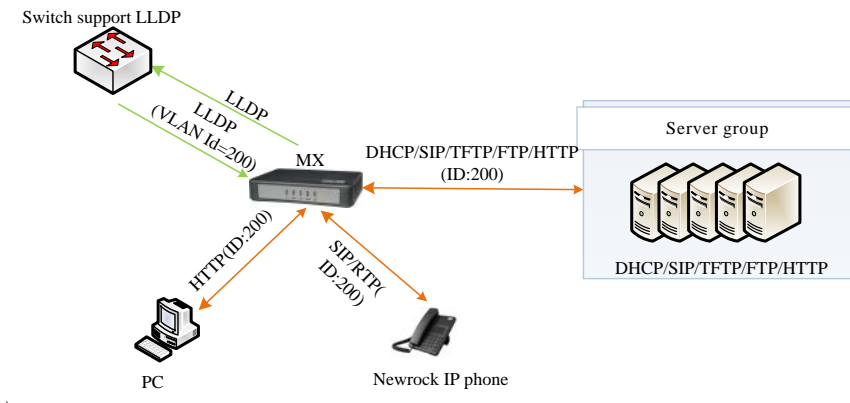
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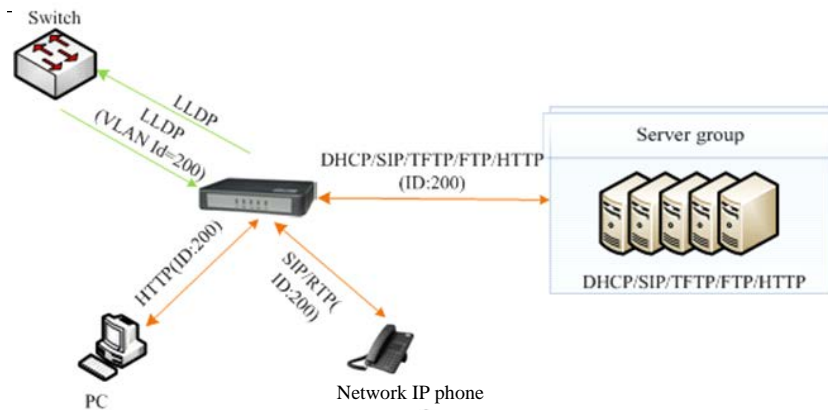


## 1.2 Automatically Enabling VLAN

Figure 1.1, below, shows the network elements referenced in the discussion that follows. It shows one VLAN segment that has a VLAN ID=200.



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**Figure 1-1 System composition**

The process consists of the following steps:

1. Smart ATA periodically sends an LLDP message to the switch with its device information. The sending interval is modifiable on the GUI interface. See Section 2 "GUI Configuration" for details.
2. Smart ATA then receives an LLDP message from the switch, and parses the VLAN ID, Priority, and DSCP (Differentiated services code point) fields.

[VLAN Configuration Guide](#) **VLAN Auto Configuration via LLDP**

If the message carries a VLAN ID, the ATA enables VLAN, adds VLAN information to subsequent messages, and obtains network information, such as an IP address, via DHCP. If VLAN was previously manually enabled on the GUI interface, its VLAN information will be replaced by the information that the device has obtained from the LLDP message.

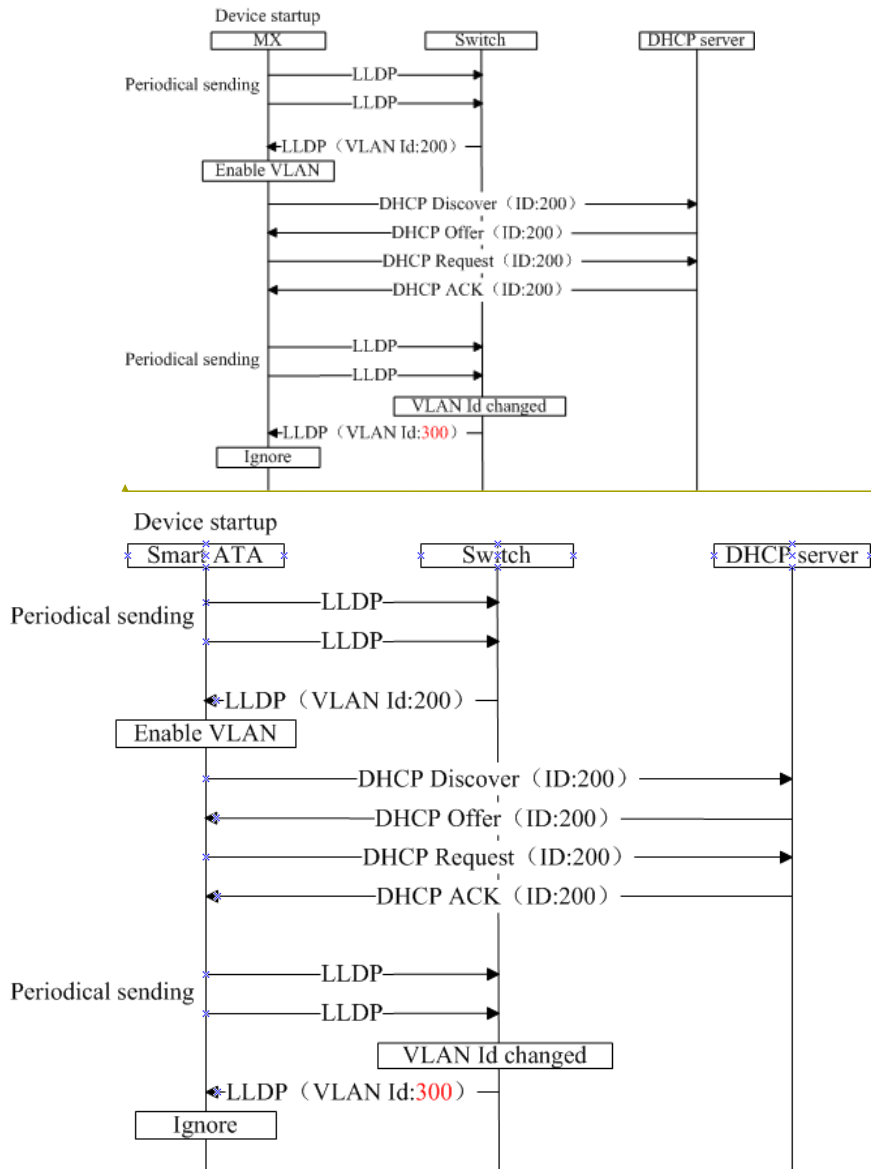
If the message does not carry a VLAN ID, the ATA checks whether VLAN is manually enabled. If it is, the ATA uses the VLAN information configured manually; otherwise, VLAN is disabled.

Figure 1-2 shows this procedure.

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**Figure 1-2 Procedure of handling LLDP message carrying a VLAN ID**



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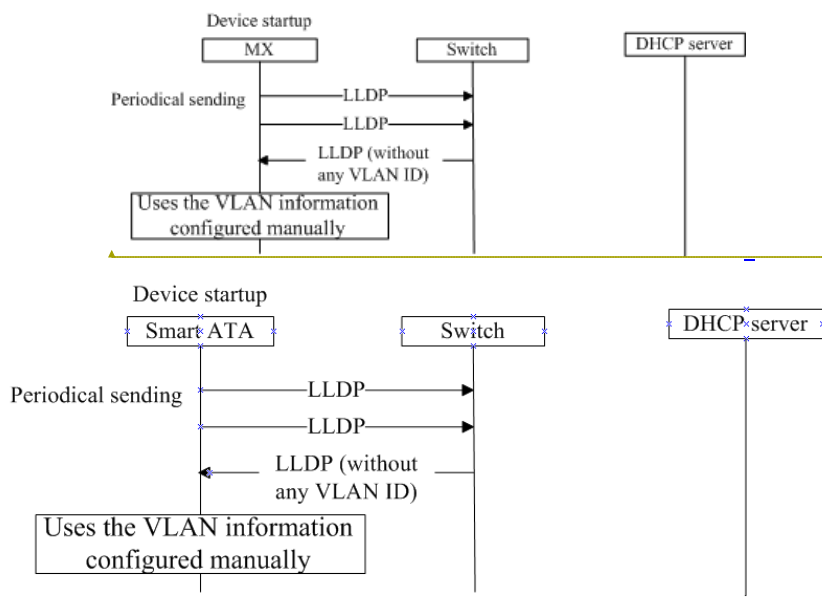
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### 1.2.1 LLDP Message with no VLAN ID

During startup, if the ATA receives an LLDP messages with no VLAN ID, it uses the VLAN information configured manually. Figure 1-3 shows the procedure.

**Figure 1-3 Procedure of handling the LLDP message with no VLAN ID**



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### 1.2.2 The LLDP Message

Upon receipt of an LLDP message, the ATA will check if the VLAN ID, Priority, and DSCP fields are included. They are shown in the red boxes, below.

Figure 1-4 shows the LLDP message.

Figure 1-4 LLDP message

```

Link Layer Discovery Protocol
  Chassis Subtype = MAC address, Id: 00:0e:a9:20:33:66
  Port Subtype = MAC address
  Time To Live = 120 sec
  System Name = VoIP-AG
  System Description = VoIP Gateway
  Capabilities
  Management Address
  Port Description = eth0
  IEEE 802.1 - VLAN Name
  IEEE 802.3 - Link Aggregation
  IEEE 802.3 - MAC/PHY Configuration/Status
  TIA TR-41 Committee - Media Capabilities
  TIA TR-41 Committee - Inventory - Software Revision
  TIA TR-41 Committee - Network Policy
    1111 111. .... = TLV Type: Organization Specific (127)
    .... ..0 0000 1000 = TLV Length: 8
    Organization Unique Code: 0x0012bb
    Media Subtype: Network Policy (0x02)
    Application Type: Voice (1)
    0... ..0000 0000 = Policy: Defined
    .1.. ..0000 0000 = Tagged: Yes
    ...0 0001 1001 000. = VLAN Id: 200
    .... ..1 01.. .... = L2 Priority: 5
    ..10 1110 = DSCP Value: 46
  End of LLDPDU
  
```

### 1.2.3 Sent Message with a VLAN ID

After obtaining a VLAN ID from the LLDP message, the ATA adds the VLAN information to the Ethernet frame headers of all messages to be sent. In addition, the ATA adds a DSCP value to RTP streams.

Figure 1-5 shows a sent message with a VLAN ID.

Figure 1-5 VLAN ID Adding a VLAN ID to the message to be sent

```

Frame 41: 218 bytes on wire (1744 bits), 218 bytes captured (1744 bits) on interface 0
Ethernet II, Src: Shanghai_00:26:90 (00:0e:a9:00:26:90), Dst: Shanghai_05:14:07 (00:0e:a9:05:14:07)
802.1Q Virtual LAN, PRI: 5, CFI: 0, ID: 200
  101. .... = Priority: Video, < 100ms latency and jitter (5)
  ...0 .... = CFI: Canonical (0)
  ... 0000 1100 1000 = ID: 200
  Type: IP (0x0800)
Internet Protocol Version 4, Src: 10.128.10.173 (10.128.10.173), Dst: 10.128.88.120 (10.128.88.120)
  Version: 4
  Header length: 20 bytes
  Differentiated Services Field: 0xb8 (DSCP 0x2e) Expedited Forwarding; ECN: 0x00: Not-ECT (Not ECN-Capable Transport)
    1011 10.. = Differentiated Services Codepoint: Expedited Forwarding (0x2e)
    .... ..00 = Explicit Congestion Notification: Not-ECT (Not ECN-Capable Transport) (0x00)
  Total Length: 200
  Identification: 0x0000 (0)
  Flags: 0x02 (Don't Fragment)
    0... ..0000 0000 = Reserved bit: Not set
    .1.. ..0000 0000 = Don't fragment: set
  
```



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## 1.2.4 GUI Configuration

This section describes VLAN configuration using the GUI.

Click **Network** on the GUI interface, and confirm that the **Activate** option in the **LLDP** area is set to **On**.

**Figure 1-6 LLDP configuration interface for Smart ATA**

The screenshot shows the LLDP configuration interface for Smart ATA. The interface is divided into several sections: Basic, Network, Routing, Phone/Line, Advanced, Status, Logs, and Tools. The Network section is active. The LLDP section is highlighted with a red box, showing the 'Activate' option set to 'On' and the 'Packet interval' set to 30 seconds. The 'VLAN configuration' section is also visible, with 'VLAN configuration' set to 'Off'.

**Table 1-1 LLDP configuration parameters**

Parameter Name	Description
Activate	<b>On:</b> Indicates that the LLDP is enabled. Then the device periodically sends LLDP messages, and parses received LLDP messages. <b>Off</b> (default value): Indicates that the LLDP is disabled. The device does not send any LLDP messages, nor parses any received LLDP messages.
Packet interval	This parameter specifies the interval at which LLDP messages are sent.. The value range is 5 to 3600 seconds. The default value is 30 seconds.

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## 1.3 Manually Enabling VLAN

### 1.3.1 Single VLAN

In single-VLAN mode, all device services belong to the same VLAN. The device receives only data packets that carry the VLAN tag and includes the VLAN tag in all sent data packets. In this mode, the physical network port of the device has no separate address and shares the IP address of the VLAN interface.

#### 1.3.1.1 Configuration

On the web interface, click **Network**, set the VLAN function to **On**, set **Mode** to **Single VLAN**, select the VLAN tag, and specify network information such as **IP address if you choose static**, as shown in Figure 1-7.

Figure 1-7 Configuring the single VLAN

VLAN configuration	
	<input checked="" type="radio"/> On <input type="radio"/> Off
Mode	<input checked="" type="radio"/> Single VLAN <input type="radio"/> Multi-service VLAN
VLAN tag	200 (range:1-4094)
VLAN QoS	5 (Voice, < 10 ms latency and jitter)
IP address assignment	DHCP
IP address	0.128.10.130
Netmask	55.255.0.0
Gateway IP address	0.128.1.1
MTU	1500 (range: 576~1500)

#### 1.3.1.2 Scenario

Configure the ATA to work in single-VLAN mode with a corresponding VLAN tag of 200 and restart the device. Check that all data packets sent by the ATA carry a VLAN ID of 200, as shown in Figure 1-8. For an example of a packet capture, see **SingleVlan.pcapng** in the appendix.

Figure 1-8 A data packet carrying a corresponding VLAN tag in the single VLAN mode

```

# Frame 15: 418 bytes on wire (3344 bits), 418 bytes captured (3344 bits) on interface 0
# Ethernet II, Src: Shanghai_00:26:90 (00:0e:a9:00:26:90), Dst: Shanghai_00:03:04 (00:0e:a9:00:03:04)
# 802.1Q Virtual LAN, PRI: 5, CFI: 0, ID: 200
  101. .... .. = Priority: Video, < 100ms latency and jitter (5)
  .... .. = CFI: Canonical (0)
  ... 0000 1100 1000 = ID: 200
  Type: IP (0x0800)
# Internet Protocol Version 4, Src: 10.128.10.130 (10.128.10.130), Dst: 192.168.88.120 (192.168.88.120)
# User Datagram Protocol, Src Port: sip (5060), Dst Port: sip (5060)
# Session Initiation Protocol (REGISTER)
    
```

### 1.3.2 Multiservice VLAN

In the case of the multiservice VLAN mode, the ATA can configure a VLAN tag; a priority for the voice service (SIP signaling and RTP media stream); and a management service (HTTP, Telnet, TR069, and SNMP). The ATA carries a different VLAN tag in data packets for different services. In this mode, the



physical network port of the device can have a separate address or obtain an address from a non-VLAN network.

### 1.3.2.1 Configuring Voice VLAN

In this mode, VLAN is used to segregate SIP, T.38, and RTP data packets.

The voice VLAN of the device has the following two modes:

- **Mode 1 - Signaling (SIP) and media stream (RTP/T.38) are on the same VLAN**
- **Mode 2 - Signaling (SIP) and media stream (RTP/T.38) are on different VLANs**



In this mode, the voice VLAN can be configured with a separate IP address.

#### Mode 1 - SIP Signaling and Media on the same VLAN

On the web interface, click **Network**, and ensure that the VLAN function is set to **On** and **Mode** is set to **Multiservice VLAN**. Select **Mode 1** for **Voice VLAN**, enter the VLAN tag, and specify the network information such as IP address.

Figure 1-9 Configuring voice VLAN to work in mode 1

VLAN configuration	
	<input checked="" type="radio"/> On <input type="radio"/> Off
Mode	<input type="radio"/> Single VLAN <input checked="" type="radio"/> Multi-service VLAN
Voice VLAN	Mode 1
VLAN tag	300 (range:1-4094)
VLAN QoS	5 (Voice, < 10 ms latency and jitter)
IP address assignment	DHCP
IP address	130.130.130.100
Netmask	255.255.255.0
Gateway IP address	130.130.130.1
MTU	1500 (range : 576~1500)



In this mode, the voice VLAN cannot be configured with a separate address but shares the IP address of the VLAN interface of the device.

#### Mode 2 - SIP Signaling and Media on Different VLANs

On the web interface, click **Network**, and ensure that the VLAN function is set to **On**, and **Mode** is set to **Multiservice VLAN**. Select **Mode 2** for **Voice VLAN**, and specify VLAN tags for SIP and RTP.

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**Figure 1-10** Configuring voice VLAN to work in mode 2

VLAN configuration	
	<input checked="" type="radio"/> On <input type="radio"/> Off
Mode	<input type="radio"/> Single VLAN <input checked="" type="radio"/> Multi-service VLAN
Voice VLAN	Mode 2 ▼
SIP VLAN TAG	300 (range:1-4094)
SIP VLAN QoS	0 (Best effort) ▼
RTP VLAN TAG	400 (range:1-4094)
RTP QoS	5 (Voice, < 10 ms latency and jitter) ▼

### 1.3.2.2 Configuring Management VLAN

The ATA includes VLAN tags configured in the management VLAN: HTTP, Telnet, TR069, and SNMP, in data packets of the four service types.

On the web interface, click **Network**, and ensure that the VLAN function is set to **On** and **Mode** is set to **Multiservice VLAN**. Select **Management VLAN**, set the VLAN tag of the management service, and specify network information such as **IP address**.

MTU (maxium transmission unit) should be left at 1500 unless there is a good reason to change it.

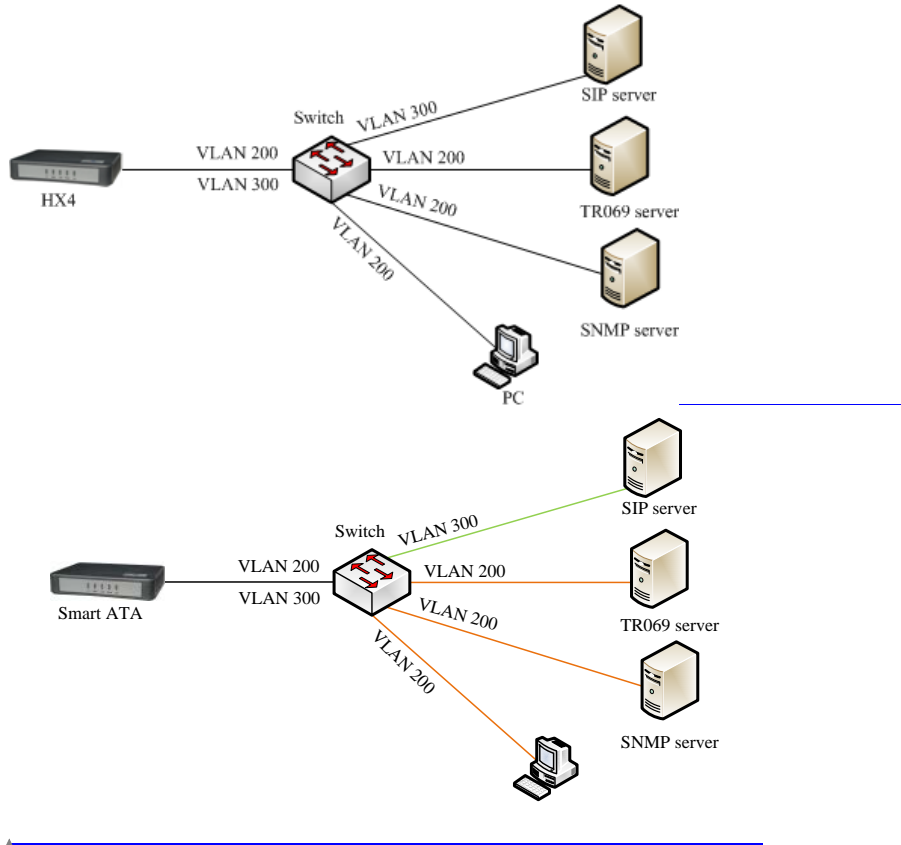
**Figure 1-11** Configuring Management VLAN

Management VLAN	<input checked="" type="checkbox"/>
VLAN tag	200 (range:1-4094)
VLAN QoS	1 (Background) ▼
IP address assignment	DHCP ▼
IP address	10.128.10.130
Netmask	255.255.0.0
Gateway IP address	10.128.1.1
MTU	1500 (range : 576~1500)

### 1.3.2.3 Scenario

Figure 1-12 shows the network environment. The ethereal ports for connecting the switch and Smart ATA are added to VLAN 200 and VLAN 300. The ethereal port for connecting the switch and SIP server is added to VLAN 300. The ethereal ports for connecting the switch to the PC (used for managing the ATA), TR069 server, and SNMP server are added to VLAN 200.

Figure 1-12 Network environment



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Configure multiservice VLAN on the ATA: the voice VLAN uses mode 1, the VLAN tag is 300, the VLAN tag of the management VLAN is 200, and the IP address is obtained from the corresponding VLAN network using DHCP, as shown in Figure 1-13.

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**Figure 1-13 Configuring multiservice VLAN**

VLAN configuration	
	<input checked="" type="radio"/> On <input type="radio"/> Off
Mode	<input type="radio"/> Single VLAN <input checked="" type="radio"/> Multi-service VLAN
Voice VLAN	Mode 1
VLAN tag	300 (range:1-4094)
VLAN QoS	5 (Voice, < 10 ms latency and jitter)
IP address assignment	DHCP
IP address	
Netmask	
Gateway IP address	
MTU	1500 (range : 576~1500)
Management VLAN	<input checked="" type="checkbox"/>
VLAN tag	200 (range:1-4094)
VLAN QoS	1 (Background)
IP address assignment	DHCP
IP address	
Netmask	
Gateway IP address	
MTU	1500 (range : 576~1500)

1. Restart the ATA for the VLAN to take effect.
2. Use the PC belonging to VLAN 200 to log in to the web page. On the Basic > Status page, the IP address of each interface of the device can be viewed, as shown in Figure 1-14. From top to bottom: IP address of the device physical network port, IP address of the management VLAN, and IP address of the voice VLAN.

**Figure 1-14 IP addresses of the device in multiservice VLAN**

Basic	Network	Routing	Phone/Line	Advanced	Status	Logs	Tools
<a href="#">Status</a>   <a href="#">System</a>   <a href="#">SIP</a>   <a href="#">MGCP</a>   <a href="#">FoIP</a>   <a href="#">Logout</a>							
Device information							
Signaling port	5060 <small>Current SIP port is 5060, please modify to avoid SIP DOS attack</small>						
Host name	VoIP-AG						
MAC address	00:0E:A9:00:26:90						
Model	HX422						
IP address	192.168.250.75						
Management VLAN IP address	10.128.10.130						
Voice VLAN IP address	130.130.130.100						

3. Enable the ATA to register with the SIP server and call an extension number on the SIP server. Check that VLAN tag 300 configured in the voice VLAN is carried in the SIP packet and RTP packet. For details about captured packets, see **multiservicevlan.pcapng** in Appendix.

**Figure 1-15 SIP data packet carrying VLAN tag of the voice VLAN in the multiservice VLAN mode**

```

Frame 30: 789 bytes on wire (6312 bits), 789 bytes captured (6312 bits) on interface 0
Ethernet II, Src: Shanghai_00:26:90 (00:0e:a9:00:26:90), Dst: Shanghai_26:02:69 (00:0e:a9:26:02:69)
802.1Q Virtual LAN, PRI: 5, CFI: 0, ID: 300
 101. .... = Priority: Video, < 100ms latency and jitter (5)
  ...0 .... = CFI: Canonical (0)
  .... 0001 0010 1100 = ID: 300
Type: IP (0x0800)
Internet Protocol Version 4, Src: 130.130.130.100 (130.130.130.100), Dst: 188.66.11.10 (188.66.11.10)
User Datagram Protocol, Src Port: sip (5060), Dst Port: sip (5060)
Session Initiation Protocol (INVITE)
  Request-Line: INVITE sip:66207701@188.66.11.10 SIP/2.0
  Message Header
    Via: SIP/2.0/UDP 188.66.11.5:5060;rport;branch=z9hG4bK-168627469014055899411405589932
    To: <sip:66207701@188.66.11.10>
    From: "66207731" <sip:66207731@188.66.11.10>;tag=14055899411405589931-1
    Call-ID: 14055899411367473044-0@130.130.130.100
    CSeq: 100020 INVITE
  
```

**Figure 1-16 RTP data packet carrying VLAN tag of the voice VLAN in the multiservice VLAN mode**

```

Frame 37: 218 bytes on wire (1744 bits), 218 bytes captured (1744 bits) on interface 0
Ethernet II, Src: Shanghai_00:26:90 (00:0e:a9:00:26:90), Dst: Shanghai_26:02:69 (00:0e:a9:26:02:69)
802.1Q Virtual LAN, PRI: 5, CFI: 0, ID: 300
 101. .... = Priority: Video, < 100ms latency and jitter (5)
  ...0 .... = CFI: Canonical (0)
  .... 0001 0010 1100 = ID: 300
Type: IP (0x0800)
Internet Protocol Version 4, Src: 130.130.130.100 (130.130.130.100), Dst: 188.66.11.10 (188.66.11.10)
User Datagram Protocol, Src Port: 10010 (10010), Dst Port: 10070 (10070)
Real-Time Transport Protocol
  [Stream setup by SDP (Frame 32)]
  10. .... = Version: RFC 1889 Version (2)
  ..0. .... = Padding: False
  ...0 .... = Extension: False
  .... 0000 = Contributing source identifiers count: 0
  0. .... = Marker: False
  Payload type: ITU-T G.711 PCMU (0)
  
```

4. Check that tag 200 of the management VLAN is carried in the HTTP packet in the PC management of the Smart ATA UI.

**Figure 1-17 HTTP data packet carrying VLAN tag of the voice VLAN in the multiservice VLAN mode**

```

Frame 1344: 777 bytes on wire (6216 bits), 777 bytes captured (6216 bits) on interface 0
Ethernet II, Src: AsustekC_74:a4:a6 (60:a4:4c:74:a4:a6), Dst: Shanghai_00:26:90 (00:0e:a9:00:26:90)
802.1Q Virtual LAN, PRI: 0, CFI: 0, ID: 200
 000. .... = Priority: Best Effort (default) (0)
  ...0 .... = CFI: Canonical (0)
  .... 0000 1100 1000 = ID: 200
Type: IP (0x0800)
Internet Protocol Version 4, Src: 10.128.10.135 (10.128.10.135), Dst: 10.128.10.130 (10.128.10.130)
Transmission Control Protocol, Src Port: serialgateway (1243), Dst Port: http (80), Seq: 1, Ack: 1, Len: 707
Hypertext Transfer Protocol
  GET /tab2.gif HTTP/1.1\r\n
  Accept: */*\r\n
  Referer: http://10.128.10.130/index1.htm\r\n
  Accept-Language: zh-CN\r\n
  User-Agent: Mozilla/4.0 (compatible; MSIE 8.0; Windows NT 6.1; wow64; Trident/4.0; SLCC2; .NET CLR 2.0.50727; .NET CLR 3.5.30729)\r\n
  Accept-Encoding: gzip, deflate\r\n
  
```

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## **2** ~~Configure with auto-provision~~

### **2.1** ~~Single VLAN mode~~

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```
[NETWORK]
//LLDP parameters
LLDP_ENABLE = on //LLDP on/off
LLDP_TX_INTERVAL = 60 //LLDP message sending period
//Single vlan parameters
DATA_VLAN = yes //Single vlan on/off
DATA_VLAN_TAG = 200 //Single vlan id
DATA_VLAN_QOS = 5 //Single vlan priority
DATA_VLAN_GETIP = 1 //Single vlan IP get method, 1:DHCP, 0:STATIC
//When DATA_VLAN_GETIP=0, need to set static IP address
DATA_IPADDR = 192.168.2.218 //Single vlan IP address
DATA_NETMASK = 255.255.0.0 //Netmask
DATA_GATEWAY = 192.168.2.1 //Gateway
```

#### **2.2** ~~Multiservice VLAN mode~~

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##### **2.2.1** ~~Mode 1—Signaling (SIP) and media stream (RTP/T.38) are on the same VLAN~~

```
[NETWORK]
DATA_VLAN = no //Single vlan should be disabled in Multiservice mode
VOICE_VLAN = yes //Voice vlan on/off
VOICE_VLAN_TAG = 200 //Voice vlan id
VOICE_VLAN_QOS = 2 //Voice vlan priority
VOICE_VLAN_GETIP = 1 //Voice vlan IP get method, 1:DHCP, 0:STATIC
//When VOICE_VLAN_GETIP=0, need to set static IP address
VOICE_IPADDR = 10.128.10.33 //Voice vlan IP address
VOICE_NETMASK = 255.255.255.0 //Voice vlan netmask
VOICE_GATEWAY = 10.128.1.1 //Voice vlan gateway
BOA_VLAN = yes //Management vlan on/off
BOA_VLAN_TAG = 300 //Management vlan id
BOA_VLAN_QOS = 3 //Management vlan priority
BOA_VLAN_GETIP = 1 //Management vlan IP get method, 1:DHCP, 0:STATIC
//When BOA_VLAN_GETIP=0, need to set static IP address
```

```
BOA_IPADDR = 192.128.10.33 //Management vlan IP address
BOA_NETMASK = 255.255.255.0 //Management vlan netmask=
BOA_GATEWAY = 192.128.1.1 //Management vlan gateway
```

### **2.2.2** Mode 2—Signaling (SIP) and media stream (RTP/T.38) are on different VLANs

```
[NETWORK]
DATA_VLAN = no //Single vlan should be disabled in Multiservice mode
VOICE_VLAN = no //Voice vlan should be disabled in Multiservice mode 2
SIP_FG_VLAN = yes //mode 2 vlan on/off
SIP_VLAN_TAG = 200 //sip vlan id
SIP_VLAN_QOS = 4 //sip vlan priority=
RTP_VLAN_TAG = 300 //rtp vlan id
RTP_VLAN_QOS = 3 //rtp vlan priority=
BOA_VLAN = yes //Management vlan on/off
BOA_VLAN_TAG = 300 //Management vlan id
BOA_VLAN_QOS = 3 //Management vlan priority=
BOA_VLAN_GETIP = 1 //Management vlan IP get method, 1:DHCP, 0:STATIC
//When BOA_VLAN_GETIP=0, need to set static IP address=
BOA_IPADDR = 192.128.10.33 //Management vlan IP address
BOA_NETMASK = 255.255.255.0 //Management vlan netmask=
BOA_GATEWAY = 192.128.1.1 //Management vlan gateway
```

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## 3-1-2.1 Parameter Description and Captured Files

Figure 2-1 VLAN configuration interface

VLAN configuration	
Mode	<input checked="" type="radio"/> On <input type="radio"/> Off
Mode	<input type="radio"/> Single VLAN <input checked="" type="radio"/> Multi-service VLAN
Voice VLAN	Mode 1 ▾
VLAN tag	300 (range:1-4094)
VLAN QoS	5 (Voice, < 10 ms latency and jitter) ▾
IP address assignment	DHCP ▾
IP address	
Netmask	
Gateway IP address	
MTU	1500 ( range : 576~1500 )
Management VLAN	<input checked="" type="checkbox"/>
VLAN tag	200 (range:1-4094)
VLAN QoS	1 (Background) ▾
IP address assignment	DHCP ▾
IP address	
Netmask	
Gateway IP address	
MTU	1500 ( range : 576~1500 )

Table 2-1 Description of parameters in the VLAN configuration interface

Parameter	Description
VLAN switch	<ul style="list-style-type: none"> <li>On: enable VLAN</li> <li>Off: disable VLAN</li> </ul>
VLAN Mode	<ul style="list-style-type: none"> <li>Single VLAN: All services of the device are on the same VLAN, and the device receives only data packets carrying the VLAN and includes the VLAN tag in all sent data packets.</li> <li>Multi-service VLAN: The device can configure different VLAN information for the voice service (SIP signaling and RTP/T.38 media stream) and the management service (HTTP, Telnet, TR069, and SNMP) and includes a different VLAN tag in a data packets of a different service.</li> </ul>
VLAN tag	Tag of the VLAN. The value ranges from 1 to 1094.
VLAN QoS	Priority of the VLAN. The value ranges from 0 to 7. A large value indicates a higher priority of a to-be-sent data packet.
Voice VLAN	VLAN to which the voice service (SIP signaling and RTP media stream) belongs. <ul style="list-style-type: none"> <li>None: disable the voice VLAN</li> <li>Mode 1: SIP and RTP are on the same VLAN</li> <li>Mode 2: SIP and RTP are on different VLANs</li> </ul>



Parameter	Description
Management VLAN	<ul style="list-style-type: none"> <li>● Selected: enable the management VLAN</li> <li>● Deselected: disable the management VLAN</li> </ul>
Network type	Type for obtaining the IP address of the VLAN interface. <ul style="list-style-type: none"> <li>● Static: set the IP address to a static IP address</li> <li>● DHCP: automatically obtain an IP address by using the DHCP protocol</li> </ul>
IP address	IP address of the VLAN interface
Netmask	Subnet mask of the VLAN interface
Gateway IP address	IP address of the gateway of the VLAN interface
MTU	Maximum Transmission Unit value of the VLAN interface. The value ranges from 576 to 1500. The default value is 1500.

Captured packet files relevant to the document:



SingleVlan.pcapng



multiservicevlan.pcapng

### 3.2.2.2 Acronyms

**DHCP** – The **Dynamic Host Configuration Protocol (DHCP)** is a [standardized](#) networking protocol used on [Internet Protocol \(IP\)](#) networks for dynamically distributing network configuration parameters, such as [IP addresses](#) or interfaces and services. With DHCP, computers request IP addresses and networking parameters automatically from a DHCP server, reducing the need for a [network administrator](#) or a user to configure these settings manually.<sup>1</sup>

**LLDP: Link-Layer Discovery Protocol** -- LLDP is a vendor-neutral [link-layer](#) protocol in the [Internet Protocol Suite](#) used by network devices for advertising their identity, capabilities, and neighbors on an [IEEE 802](#) local -area network, principally wired [Ethernet](#). The protocol is formally referred to by the IEEE as *Station and Media Access Control Connectivity Discovery* specified in standards document **IEEE 802.1AB**.<sup>2</sup>

<sup>1</sup> Wikipedia

<sup>2</sup> Wikipedia

### 3.3-2.3 VLAN introduction

Virtual LAN – In **computer networking**, a single **layer-2 network** may be **partitioned** through **software** to create multiple distinct **broadcast domains** that are mutually isolated so that packets can only pass between them via one or more **routers**; such a domain is referred to as a virtual local area network, virtual LAN or VLAN.

Attached below is a packet capturing file for LLDP messages with VLAN ID.



Netgen.pcapng

### 2.4 Configure VLAN via auto-provision

Node	Parameter	Description	Value
[NETWORK]	<u>LLDP_ENABLE</u>	Enabling LLDP	Parameter value should be on or off. CFG_UPGRADE = on to enable LLDP CFG_UPGRADE = off to disable LLDP
	<u>LLDP_TX_INTERVAL</u>	LLDP message sending interval	The default value is 60 seconds.
	<u>DATA_VLAN</u>	Enabling single vlan	Parameter value should be yes or no. DATA_VLAN = yes to enable single VLAN DATA_VLAN = no to disable single VLAN Single vlan should be disabled in Multiservice mode.
	<u>DATA_VLAN_TAG</u>	Single vlan ID	1-4094
	<u>DATA_VLAN_QO</u>	Single vlan priority	1-7
	<u>S</u>		

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### 3.4 Multiservice VLAN mode

#### 3.4.1 Mode 1 - Signaling (SIP) and media stream (RTP/T.38) are on the same VLAN

[NETWORK]

DATA\_VLAN = no //Single vlan should be disabled in Multiservice mode  
VOICE\_VLAN = yes //Voice vlan on/off  
VOICE\_VLAN\_TAG = 200 //Voice vlan id  
VOICE\_VLAN\_QOS = 2 //Voice vlan priority  
VOICE\_VLAN\_GETIP = 1 //Voice vlan IP get method,1:DHCP; 0:STATIC  
//When VOICE\_VLAN\_GETIP=0, need to set static IP address  
VOICE\_IPADDR = 10.128.10.33 //Voice vlan IP address  
VOICE\_NETMASK = 255.255.255.0 //Voice vlan netmask  
VOICE\_GATEWAY = 10.128.1.1 //Voice vlan gateway  
BOA\_VLAN = yes //Management vlan on/off  
BOA\_VLAN\_TAG = 300 //Management vlan id  
BOA\_VLAN\_QOS = 3 //Management vlan priority  
BOA\_VLAN\_GETIP = 1 //Management vlan IP get method,1:DHCP; 0:STATIC  
//When BOA\_VLAN\_GETIP=0, need to set static IP address  
BOA\_IPADDR = 192.128.10.33 //Management vlan IP address  
BOA\_NETMASK = 255.255.255.0 //Management vlan netmask  
BOA\_GATEWAY = 192.128.1.1 //Management vlan gateway

#### 3.4.2 Mode 2 - Signaling (SIP) and media stream (RTP/T.38) are on different VLANs

[NETWORK]

DATA\_VLAN = no //Single vlan should be disabled in Multiservice mode  
VOICE\_VLAN = no //Voice vlan should be disabled in Multiservice mode 2  
SIP\_FG\_VLAN = yes //mode 2 vlan on/off  
SIP\_VLAN\_TAG = 200 //sip vlan id  
SIP\_VLAN\_QOS = 4 //sip vlan priority  
RTP\_VLAN\_TAG = 300 //rtp vlan id  
RTP\_VLAN\_QOS = 3 //rtp vlan priority  
BOA\_VLAN = yes //Management vlan on/off  
BOA\_VLAN\_TAG = 300 //Management vlan id  
BOA\_VLAN\_QOS = 3 //Management vlan priority  
BOA\_VLAN\_GETIP = 1 //Management vlan IP get method,1:DHCP; 0:STATIC  
//When BOA\_VLAN\_GETIP=0, need to set static IP address  
BOA\_IPADDR = 192.128.10.33 //Management vlan IP address  
BOA\_NETMASK = 255.255.255.0 //Management vlan netmask  
BOA\_GATEWAY = 192.128.1.1 //Management vlan gateway

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