New Rock Technologies, Inc.

Auto Provisioning Configuration Manual

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1 Overview

1.1 Definition

The VoIP gateway and IP-PBX devices launched by New Rock Technologies Inc. support auto-provision, which allows remote and central management of device configuration and firmware upgrades. With this device management scheme, the firmware upgrade packages and configuration files are stored and managed on an auto configuration server (ACS), and the devices visit the ACS when powered on or periodically and downloads the latest firmware package or configuration files.

Features:

- Selectively configuring or upgrading some devices or all devices
- Selectively configuring part of parameters or all parameters
- TFTP, FTP, or HTTP mode
- Obtaining ACS URL via DHCP option 66 or redirection mechanism

Advantages:

- Drive down care cost for the carriers or any sizable deployment by supporting highly-efficient and remote device management and maintenance
- Remove the potential risk of loss of data and data intrusion by providing configuration file backup and data encryption on transmission
- Easy to implement

This guidance is applicable to the following devices:

- HX4
- HX4E
- MX8
- MX8A
- MX60
- MX120
- MX100E
- MX100G
- WROC2000
- WROC3000
- OM12
- OM80

- OM200
- OM20
- OM50

1.2 How Auto-Provision Works

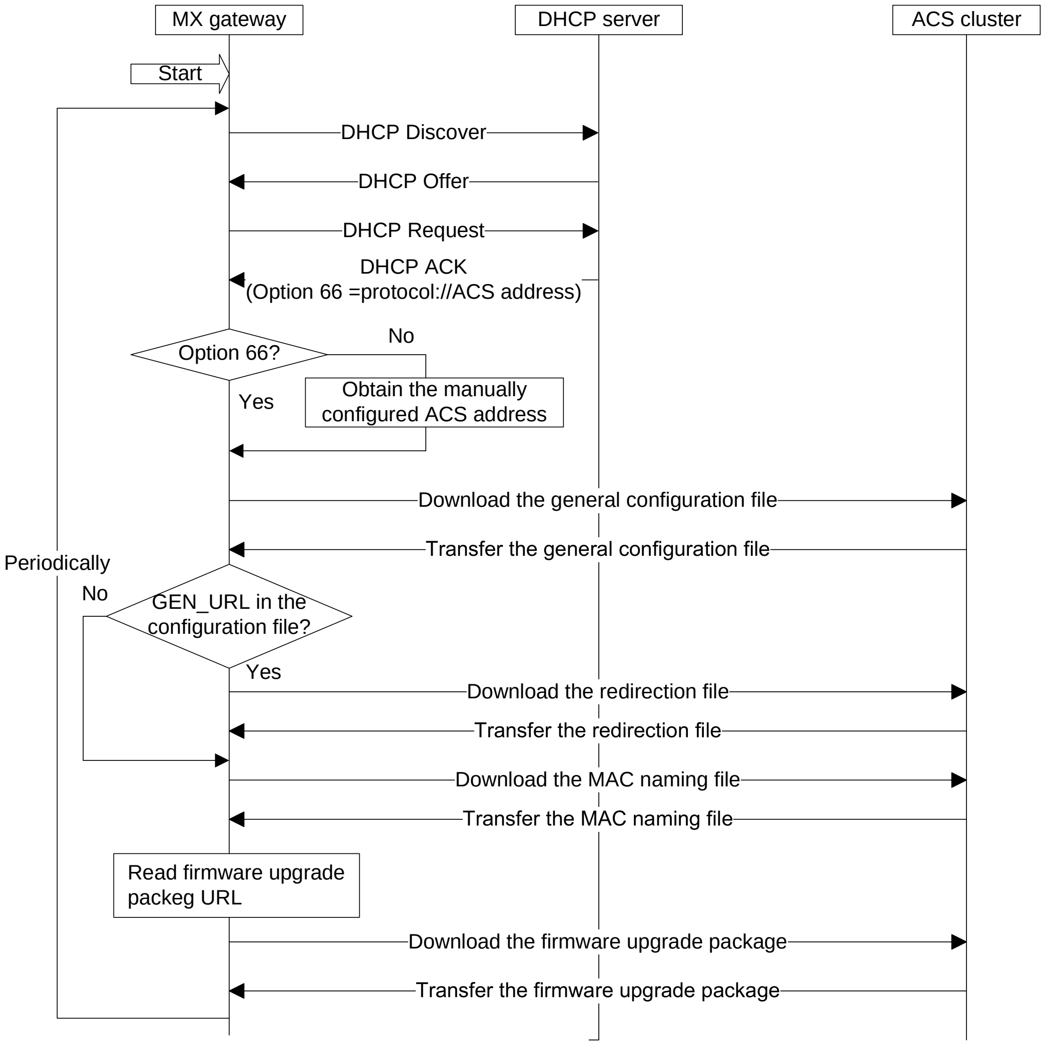
To deploy a device provisioning network based on auto-provision, a TFTP, FTP, HTTP or HTTPS-based Auto Configuration Server (ACS) needs to be set up with the following conditions:

- Accessible to all devices through either Internet or private network
- Store configuration files and firmware upgrade packages

The device can contact the ACS with the URL preset in the device, or automatically discovered via DHCP option 66 or redirection mechanism. For details, see Chapter 4 Obtaining an ACS URL.

With auto provision feature enabled, the device will visit the ACS every time upon powering up / reboot, or periodically based on the pre-set period. The downloading of the latest firmware and configuration files will take effect immediately or after a delay period. The Figure below displays the interaction between a device and an ACS.

Figure 1-1 Flowchart of the Updating Process (take an MX device as an example)


MX gateway
DHCP server
ACS cluster
Start
DHCP Discover
DHCP Offer
DHCP Request
DHCP ACK
(Option 66 =protocol://ACS address)
Option 66?
No
Yes
Obtain the manually configured ACS address
Download the general configuration file
Transfer the general configuration file
Periodically
No
GEN_URL in the configuration file?
Yes
Download the redirection file
Transfer the redirection file
Download the MAC naming file
Transfer the MAC naming file
Read firmware upgrade packeg URL
Download the firmware upgrade package
Transfer the firmware upgrade package

Note

- If DHCP option 66 is selected to broadcast the URL of ACS, the ACS can be a TFTP server, a HTTP server or a HTTPS server.
- The ACS URL can be in IP address or domain name format. If the ACS URL is in later format, you need to configure and enable the DNS server on the device: log into the Web GUI of the device and choose **Basic** > **Network**, enter the IP address of the primary DNS server in the Primary server text box, and then click **Submit**.
- Currently, HTTP/HTTPS supports the basic access authentication mode only.

2 Establishing the ACS

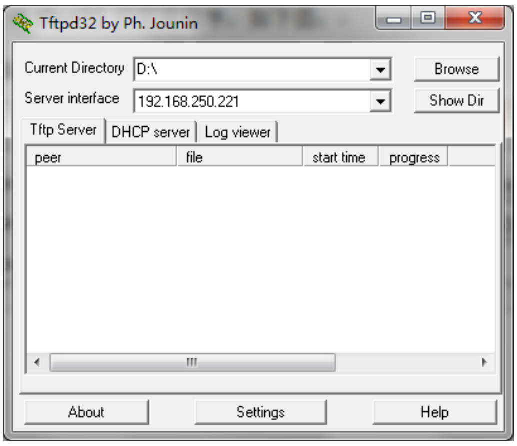
This chapter uses the TFTP server as an example to describe how to set up the ACS.

The TFTP server can be established using software such as 3CDaemon or Tftpd32. In the following description, tftpd32 is used as an example. Note that tftpd32 can also be used to establish a DHCP server.

Step 1 Create a root TFTP directory on the local computer and place the configuration files to this root directory. For preparing the configuration files, see Chapter 3 Preparing Configuration Files.

Step 2 Download, install, and start Tftpd32.

Figure 2-1 Main Interface of Tftpd32



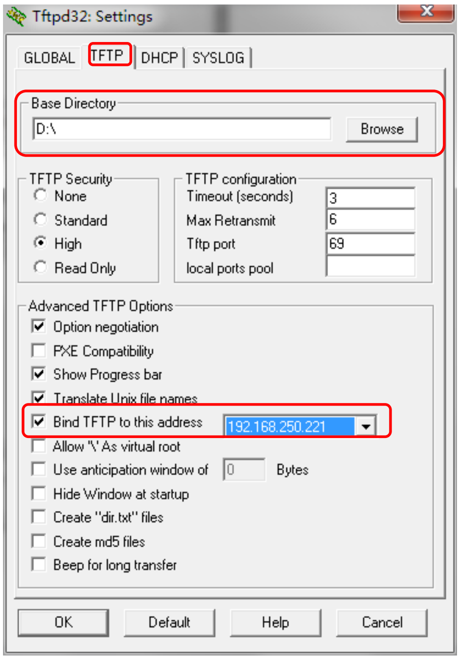
Tftpd32 by Ph. Jounin

Current Directory D:\

Server interface 192.168.250.221

Step 3 Click **Settings**, and click the **TFTP** tab. Then select the root directory of the server for storing configuration files and firmware upgrade packages from the **Base Directory**, select **Bind TFTP to this address**, and specify the TFTP server address.

Figure 2-2 TFTP Configuration Interface of Tftpd32



Tftpd32: Settings

Base Directory
D:\

TFTP Security
○ None
○ Standard
● High
○ Read Only

TFTP configuration
Timeout (seconds) 3
Max Retransmit 6
Tftp port 69
local ports pool

Advanced TFTP Options
☑ Option negotiation
□ PXE Compatibility
☑ Show Progress bar
☑ Translate Unix file names
☑ Bind TFTP to this address 192.168.250.221
□ Allow '\' As virtual root
□ Use anticipation window of 0 Bytes
□ Hide Window at startup
□ Create "dir.txt" files
□ Create md5 files
□ Beep for long transfer

3 Preparing Configuration Files

3.1 Configuration Files

3.1.1 General Configuration File

The general configuration file is effectual for all the devices with the same model. The following table shows mappings between device models and file names.

Table 3-1 Mappings between Device Models and Names of General Configuration Files

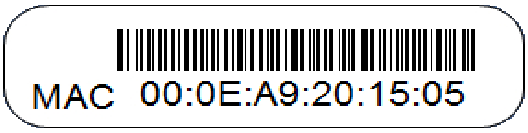
Model	**Name of the General Configuration File**
HX4	N0000J1.cfg
HX4E	N0000P1.cfg
MX8/OM12	N0000B2.cfg
MX8A	N0000N1.cfg
MX60	N0000H1.cfg
MX120/OM200	N0000F1.cfg
MX100E/MX100G	N0000L1.cfg
WROC2000	N0000K1.cfg
WROC3000	N0000M1.cfg
OM80	N0000H3.cfg
OM20	N0000P1.cfg
OM50	N0000N1.cfg

3.1.2 MAC-addressed File

.The MAC-addressed configuration file is only effectual for the specific device. It uses 12-digit MAC address of the device as the file name. For example, if the MAC address of a device is 00:0E:A9:20:15:05, its configuration file is named **000EA9201505.cfg**.

There is an MAC address label on the shell of the device chassis.

Figure 3-1 MAC Address Label



Note

- The suffix of the configuration file name must be cfg in lower case.
- To avoid configuration conflicts, do not maintain the device shared with same general configuration file name, for example, the HX4E/OM20 and MX8A/OM50 listed on the table above.

3.2 Common Configuration Parameters

The parameters listed below are commonly used. For the details of other parameters, please contact your dealer or customer contact center.

Table 3-2 Common Configuration Parameters

Node Name	**Parameter**	**Meaning**	**Value Range**
[DIGITMAP]	DEFAULT_DIGIT_MAP	Digit map	The content of this parameter depends on the dialing plan. Common default factory settings: **(01[3-5,8]xxxxxxxxx|010xxxxxxxx|** **02xxxxxxxxx|0[3-9]xxxxxxxxxx|120|** **11[0,2-9]|111xx|123xx|95xxx|100xx|** **1[3-5,8]xxxxxxxxx|[2-3,5-7]xxxxxxx|** **8[1-9]xxxxxx|80[1-9]xxxxx|800xxxxxxx|** **4[1-9]xxxxxx|40[1-9]xxxxx|400xxxxxxx|** **xxxxxxxxxx.T|x.#|#xx|*xx|##)** For details about configuration rules, consult the corresponding User Manual based on the device model, or contact technical support.
[SIP]	SIP_REG_EXPIRES	Registration duration	15 to 86400 seconds; 600 seconds by default
	SIP_PROXY	Proxy server address	Example: 168.33.134.51:5000 or www.sipproxy.com:5000 (5060 by default if the port number is not configured)
	SIP_REGISTRATION	Registration server address	Same as above
[AUTOPROVISION]	FIRM_UPGRADE	Whether to enable the firmware upgrade function	**Y**: enabled **N**: disabled Note: The value takes effect immediately rather than next time when the device visits ACS.

Node Name	Parameter	Meaning	Value Range
	FIRM_URL	URL for Firmware upgrade package	Specific formats corresponding to the four types of servers: **tftp://***Server address/Firmware upgrade package* **ftp://***Username: password* **@** *Server address/Firmware upgrade package* **http://***Username: password* **@** *Server address/Firmware upgrade package* **https://***Username: password* **@** *Server address/Firmware upgrade package* Note: 1. The server address can be in IP address or domain name format. If the server address is in domain name format, the DNS server needs to be configured on the device. 2. When specifying the firmware upgrade package, ensure that the name contains the suffix of the firmware upgrade package. 3. Fields **tftp**, **ftp**, **http** and **https** must be in lower case.
	UPGRADE_TYPE	Update mode	**0**: Power on **1**: Power on + Periodical
	CFG_INTVL	Update interval	5 to 86400 seconds; 3600 seconds by default Note: This parameter needs to be configured when the update mode is set to **Power on + Periodical**.

Node Name	Parameter	Meaning	Value Range
	GEN_URL	URL for Redirection file	Specific formats corresponding to the four types of servers: **tftp://***Server address/Redirection file name* **ftp://***Username: password* **@** *Server address/Redirection file name* **http://***Username: password* **@** *Server address/Redirection file name* **https://***Username: password* **@** *Server address/Redirection file name* Note: 1. The server address can be in IP address or domain name format. If the server address is in domain name format, the DNS server needs to be configured. 2. The redirection file name can be the name of any custom file. It can be **$MA.cfg**, indicating the configuration file named after the MAC address of the device, where **MA** must be in upper case. 3. Fields **tftp**, **ftp**, **http** and **https** must be in lower case. 4. This parameter applies to a general configuration file only. 5. For details about the application scenarios of this parameter, see Scenario 4 in Table 4-2 DHCP Configuration Parameters of Tftpd32.
[PROFILE]	PHONE_**n**	Phone number of extension set **n**	The value of **n** ranges from 1 to the maximum number of extension sets supported by the device.
	PASSWD_**n**	Password for extension set **n**	-
	REG_**n**	Registration flag for extension **n**	**on**: The registration function is enabled for the account of the extension set. **off**: The registration function is disabled for the account of the extension set.
[PASSWORD]	WEB_PASSEORD	Administrator login password for the Web interface	The length is 8 to 16 characters; ’&’ and ’=’ cannot be used.
	WEB_OPER_PASSWORD	Operator login password for the Web interface	The length is 8 to 16 characters; ’&’ and ’=’ cannot be used.
[SYSTEM]	RTP_PORT_MIN	Minimum RTP port number	Value range: 3000–65535
	RTP_PORT_MAX	Maximum RTP port number	Value range: 3020–65535

Node Name	Parameter	Meaning	Value Range
	DTMF_METHOD	DTMF transmission mode	2833: RFC2833 AUDIO: transparent transmission INFO: SIP INFO 2833+INFO: RFC2833+ SIP INFO
	DEFAULT_CODEC	Codecs supported by device	See *User Manual* or *Administrator Manual* of each device.
[OPTIONAL]	SDP_USING_NAT	SDP using NAT address switch	Yes: A WAN address is used. No: A local IP address is used.
	NAT_KEEP_ALIVE	NAT traversal switch	on: enabled/off: disabled
	NAT_EXPIRE	NAT refresh interval	Value range: More than 14 seconds; the default value is 60 seconds.
	COUNTRY	Country calling code	Refer to "List of ITU-T Recommendation E.164 Dialling Procedures as of 15 December 2011" ITU.
	DIGIT_ON_TIME	DTMF tone duration	The duration time range is 50 to 150 ms. The default value is 100 ms.
	DIGIT_OFF_TIME	DTMF Interdigit pause	The duration time range is 50 to 150 ms. The default value is 100 ms.
[NETWORK] Note: These parameters are applicable to all device models as described in this document.	LLDP_ENABLE	LLDP switch	on: enabled/off: disabled
	LLDP_TX_INTERVAL	LLDP message sending interval	5–3600 seconds; the default value is 30 seconds. Note: This parameter is mandatory when LLDP is enabled.
	DATA_VLAN	Global VLAN	on: enabled/off: disabled Note: Global VLAN must be disabled when multi-service VLAN is enabled.
	DATA_VLAN_TAG	Global VLAN tag	Value range: 1–4094
	DATA_VLAN_QOS	Global VLAN priority	Value range: 0–7
	DATA_VLAN_GETIP	Global VLAN address acquiring mode	1: DHCP 0: STATIC Note: When DATA_VLAN_GETIP=0: DATA_IPADDR, DATA_NETMASK, and DATA_DEVICE are mandatory.
	DATA_IPADDR	Global IP address	When DATA_VLAN_GETIP=0: this parameter is mandatory.
	DATA_NETMASK	Global subnet mask	
	DATA_DEVICE	Global device address	

Node Name	Parameter	Meaning	Value Range
	VOICE_VLAN	Voice VLAN switch	on: enabled/off: disabled Note: Voice VLAN must be disabled when the multi-service VLAN Mode 2 is enabled.
	VOICE_VLAN_TAG	Voice VLAN tag	Value range: 1–4094
	VOICE_VLAN_QOS	Voice VLAN priority	Value range: 0–7
	VOICE_VLAN_GETIP	Voice VLAN address acquiring mode	1: DHCP 0: STATIC Note: When VOICE_VLAN_GETIP =0: VOICE_IPADDR, VOICE_NETMASK, and VOICE_DEVICE are mandatory.
	VOICE_IPADDR	Voice VLAN IP address	When VOICE_VLAN_GETIP =0: this parameter is mandatory.
	VOICE_NETMASK	Voice VLAN subnet mask	
	VOICE_DEVICE	Voice VLAN device address	
	SIP_FG_VLAN	Multi-service VLAN Mode 2 switch	on: enabled/off: disabled Note: Voice VLAN must be disabled when multi-service VLAN Mode 2 is enabled.
	SIP_VLAN_TAG	SIP VLAN tag	Value range: 1–4094
	SIP_VLAN_QOS	SIP VLAN priority	Value range: 0–7
	RTP_VLAN_TAG	RTP VLAN tag	Value range: 1–4094
	RTP_VLAN_QOS	RTP_VLAN priority	Value range: 0–7
	BOA_VLAN	Management VLAN switch	yes: enabled/no: disabled
	BOA_VLAN_TAG	Management VLAN tag	Value range: 1–4094
	BOA_VLAN_QOS	Management VLAN priority	Value range: 0–7
	BOA_VLAN_GETIP	Management VLAN address acquisition mode	1: DHCP 0: STATIC Note: When BOA_VLAN_GETIP =0: BOA_IPADDR, BOA_NETMASK, and BOA_DEVICE are mandatory.
	BOA_IPADDR	Management VLAN IP address	When BOA_VLAN_GETIP =0: this parameter is mandatory.
	BOA_NETMASK	Management VLAN subnet mask	
	BOA_GATEWAY	Management VLAN device address	
	TIME_SERVER	Time server	

Node Name	Parameter	Meaning	Value Range
[NETWORK]] Note: These parameters are applicable to HX4/MX8/MX60/MX100E/MX100G/MX120/OM12/OM80/OM200 devices.	ETH0_DHCP	Management IP address acquiring mode	on: When a device IP address is dynamically obtained: the LOCAL_IP_ADDRESS, ETH0_NETMASK, and DEVICE do not need to be configured. off: When a static device IP address is configured: LOCAL_IP_ADDRESS, ETH0_NETMASK, and DEVICE are mandatory.
	LOCAL_IP_ADDRESS	Statically configure an IP address for a device	
	ETH0_NETMASK	Statically configure a subnet mask for a device	
	DEVICE	Statically configure a device address for a device	
	DNS_RESOLVE	Domain name resolution service switch	on: enabled/off: disabled
	DNS_SERVER	Primary DNS server	
	DNS_SERVER2	Secondary DNS server	
	TIMEZONE	Time zone	
[ATA] These parameters are applicable to HX4E/MX8A/WROC2000/WROC3000/OM20/OM50 devices.	Bridge_ConnectionMode	Device IP address acquisition mode	STATIC: When a static device IP address is configured: Bridge_ipaddr, Bridge_netmask, Bridge_device, Bridge_primary_dns, and Bridge_secondary_dns are mandatory. DHCP: When a device IP address is obtained dynamically: Bridge_dhcp_manual_dns, Bridge_dhcp_pri_dns, and Bridge_dhcp_sec_dns are mandatory. PPPOE: When a device IP address is obtained by using PPPoE, Bridge_pppoe_user: Bridge_pppoe_pass, Bridge_pppoe_manual_dns, Bridge_pppoe_pri_dns, and Bridge_pppoe_sec_dns are mandatory.
	Bridge_ipaddr	Statically configure an IP address for a device	
	Bridge_netmask	Statically configure a subnet mask for a device	
	Bridge_device	Statically configure a device address for a device	
	Bridge_primary_dns	Manually configure the IP address of the primary DNS server when the IP address of a device is statically configured	

Node Name	Parameter	Meaning	Value Range
	Bridge_secondary_dns	Manually configure the IP address of the secondary DNS server when the IP address of a device is statically configured	
	Bridge_dhcp_manual_dns	DNS configuration mode when DHCP mode is used	0: Obtaining a DNS address by using DHCP when an IP address is obtained by using DHCP. 1: Manually configuring a DNS address by using DHCP when an IP address is obtained by using DHCP.
	Bridge_dhcp_pri_dns	Manually configuring address of the primary DNS server when an IP address is acquired by using DHCP	
	Bridge_dhcp_pri_dns	Manually configuring address of the secondary DNS server when an IP address is acquired by using DHCP	
	Bridge_pppoe_user	PPPoE user name	
	Bridge_pppoe_pass	PPPoE password	
	Bridge_pppoe_manual_dns	DNS configuration mode when PPPoE mode is used	0: Obtaining a DNS address using PPPoE when an IP address is obtained using PPPoE. 1: Manually configuring a DNS address using PPPoE when an IP address is obtained using PPPoE
	Bridge_pppoe_pri_dns	Manually configuring address of the primary DNS server when an IP address is acquired using PPPoE	
	Bridge_pppoe_sec_dns	Manually configuring address of the secondary DNS server when an IP address is acquired using PPPoE	
	TZ	Time zone	
[TDM] These parameters are applicable to MX100G devices.	TDM_DS1_TYPE	Set the interface to operate as an E1 or T1 interface.	E1 or T1. The default value is E1.
	TDM_DS0_TYPE	PCM codec	It can be aLaw or uLaw. The default value is aLaw.

Node Name	Parameter	Meaning	Value Range
[ISDN] These parameters are applicable to MX100G devices.	ISDN_TYPE_X	Signaling Standard	The variation of ISDN PRI signalling standards: CCITT, NI2, DMS100, DMS250 and 5ESS. You are recommended to select NI2 for T1 card and CCITT for E1 card.
	ISDN_HUNT_X	Search mode of idle time slot	• FORWARD: In the case of an incoming call, the MX100G first checks whether timeslot 1 is idle. If not, the MX100G checks whether timeslot 2 is idle. The process proceeds in the ascending order until an idle timeslot is found. • BACKWARD: The MX100G searches for an idle timeslot in the descending order. • CIRCULAR: The MX100G searches for the next idle timeslot in the ascending order starting from the time slot used last time. The default value is FORWARD.
	ISDN_GRID_X	Enable or disable ISDN interfaces	0: Disable ISDN interface 1: Enable ISDN1 interface 2: Enable ISDN2 interface 3: Enable ISDN3 interface 4: Enable ISDN4 interface
[ROUTE]		Configure routing rules	For details, see *User Manual* or *Administrator Manual* of each device.

Note

- The parameters of almost all functions configurable on the GUI interface of device can be updated in configuration files.
- The same parameter takes effect in both the generation configuration file and the MAC-addressed configuration file, except for the parameter *GEN_URL* that takes effect only in the general configuration file.
- Parameters take effect in the following files in descending order based on priorities: Redirection file > MAC-addressed configuration file > General *configuration* file.

  When the same parameter exists in all of the general configuration file, the MAC-addressed configuration file, and the redirection file (rather than redirection to **$MA.cfg**), the device validates the value of this parameter in the redirection file.

  When the same parameter exists in the general configuration file and the MAC-addressed configuration file, the device validates the value of this parameter in the MAC-addressed configuration file.
- Most parameters take effect in real time; except for those network or registration-related parameters that do not take effect until the device is restarted (the device will automatically restart as required).

3.3 Editing Configuration Files

You can download the configuration file template for modification in Appendix 2: Configuration File Template. Please note that the template contains the parameters that are commonly used. If you need other parameters included, please contact your dealer or customer contact center.

The configuration files need to be determined according to the application scenario by referring to the following table. For details about the parameters, see Table 3-2 Common Configuration Parameters.

Table 3-3 Application Scenarios of Configuration Files

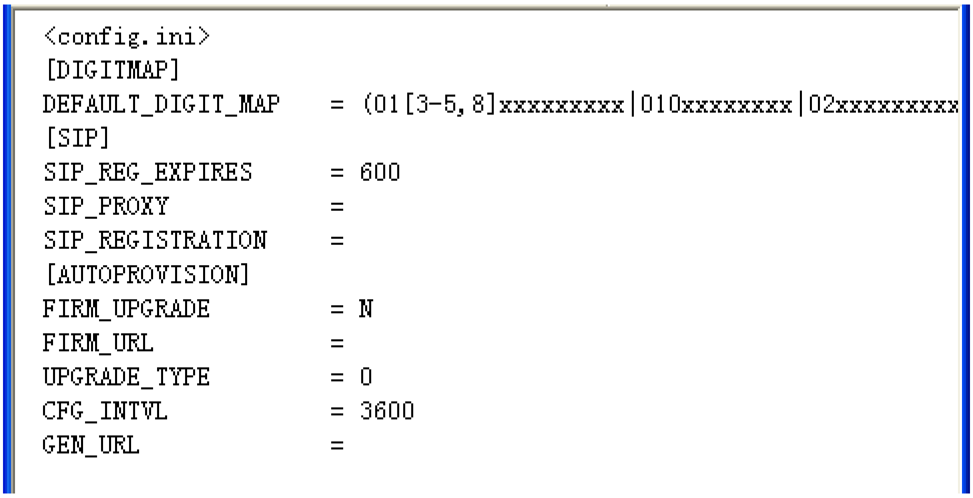
No.	Scenario	Instructions
1	Auto provision of one device	Prepare a configuration file on the ACS, which can be either a general configuration file or a MAC-addressed configuration file.
2	Auto provision of three devices A, B, and C, where some parameters need to be updated for device C only	1. Prepare a generation configuration file on the ACS, which contains the common parameter settings for the three devices. 2. Prepare a configuration file named after the MAC address of device C on the ACS, and configure the parameters to be updated for device C.
3	Auto provision of three devices A, B, and C. The parameter α needs to be updated for all three devices, but the value of parameter α for device C is different from that for devices A and B	1. Prepare a generation configuration file on the ACS, which contains the common parameter settings for the three devices, and set parameter α to the target new value for devices A and B. 2. Prepare a configuration file named after the MAC address of device C on the ACS, and set parameter α to the target new value for device C. Note: If identical parameters exist in the general configuration file and the MAC-addressed configuration file, the device validates the parameters configured in the MAC-addressed configuration file.
4	The general configuration file and the MAC-addressed configuration files of various devices are located on separate ACSs	1. Prepare a general configuration file on ACS 1, and configure the parameter *GEN_URL=* **tftp://***Address of ACS 2***/$MA.cfg** for the depository of the .cfg files, assuming TFTP server is used. 2. Prepare configuration files that are named after the MAC addresses of the devices on ACS 2. Note: **$MA.cfg** indicates the configuration file named after the MAC address of each device. When reading this parameter, a device converts it to the corresponding file name based on the MAC address of the device itself.

Note

- **MA** in **$MA.cfg** must be in upper case.
- The address of ACS 2 can be in IP address or domain name format. If the address is in domain name format, the DNS server needs to be configured.
- If the ACS is FTP, HTTP or HTTPS server, the parameter *GEN_URL* is written based on the-defined rule in Table 3-2 Common Configuration Parameters.

Editing a General Configuration File

Figure 3-2 General Configuration File



```
<config.ini>
[DIGITMAP]
DEFAULT_DIGIT_MAP    = (01[3-5,8]xxxxxxxxx|010xxxxxxxx|02xxxxxxxxx
[SIP]
SIP_REG_EXPIRES      = 600
SIP_PROXY            =
SIP_REGISTRATION     =
[AUTOPROVISION]
FIRM_UPGRADE         = N
FIRM_URL             =
UPGRADE_TYPE         = 0
CFG_INTVL            = 3600
GEN_URL              =
```

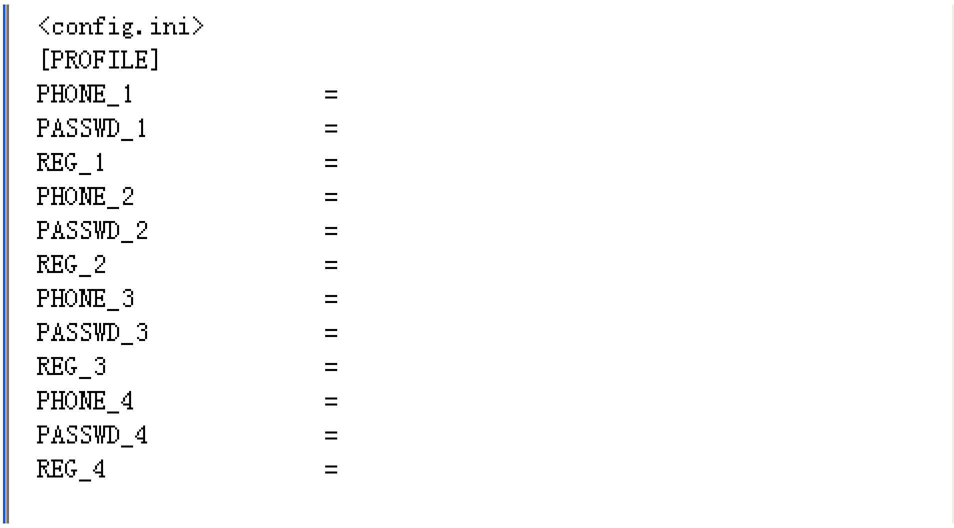
Table 3-4 Examples of Configuration Update

Example	<config.ini>
	[DIGITMAP]
	#Digit map describes the dialing plan used in your country
	DEFAULT_DIGIT_MAP =
	(*x.T|*1xx|[2-9]11|1[2-9]xxxxxxxxx|[2-9]1[0,2-9]xxxxxxx|[2-9][0,2-9]xxxxxxxx)
	[SIP]
	#Enter the SIP proxy address here
	SIP_PROXY =
	#Enter the SIP registration server address here
	SIP_REGISTRATION = 192.168.2.100

Basic Rule	• The first row must be **<config.ini>** in lower case without any blank in between. • If a row starts with "#", it indicates that this row does not take effect. • The configuration file consists of parameter nodes and parameters, and the parameters must be placed under corresponding parameter nodes. For example: **[DIGITMAP]** and **[SIP]** are parameter nodes. **DEFAULT_DIGIT_MAP**, **SIP_PROXY** and **SIP_REGISTRATION** are parameters. The parameter **DEFAULT_DIGIT_MAP** must be placed under parameter node **[DIGITMAP]**. Parameters **SIP_PROXY** and **SIP_REGISTRATION** must be placed under parameter node [SIP]. • The parameter node must occupy a row separately. The parameter node names shall be included in square brackets and shall not contain any blank. • If the value of a parameter in a parameter row is null, the parameter shall still be followed by an equal sign (=). • The parameter name and the equal sign (=) are separated from each other using a blank or tab, so are the parameter value and the equal sign (=). • All parameter node names and parameter names shall be in upper case.

Editing a MAC-addressed Configuration File

Figure 3-3 MAC-addressed Configuration File



```
<config.ini>
[PROFILE]
PHONE_1                  =
PASSWD_1                 =
REG_1                    =
PHONE_2                  =
PASSWD_2                 =
REG_2                    =
PHONE_3                  =
PASSWD_3                 =
REG_3                    =
PHONE_4                  =
PASSWD_4                 =
REG_4                    =
```

3.4 Encrypting a Configuration File (Optional)

To prevent device configuration data from being intercepted, you are advised to use encryption tools **mxenc** (for Linux) or **enc_windows.exe** (for Windows), which are developed by New Rock Technologies Inc., to encrypt a configuration file before placing the configuration file on the ACS.

Encryption on a Linux PC

Step 1 Obtain the encryption tool **mxenc**, and install it on a Linux PC.

Step 2 Run the **chmod 777 mxenc** command to ensure that the encryption tool mxenc is executable.

Step 3 Upload the configuration file to the directory where the encryption tool mxenc is located.

Step 4 Start the encryption tool mxenc using the **./mxenc** *Name of the unencrypted file Name of the encrypted file MAC address* command.

The encrypted file must be named in accordance with the formats described in Section 3.1 Configuration Files. The name of the unencrypted file does not need to follow these formats.

Encryption on a Windows PC

Step 1 Obtain the encryption tool **enc_windows.exe**, and install it on a Windows PC.

Step 2 Upload the configuration file to the directory where the encryption tool **enc_windows.exe** is located.

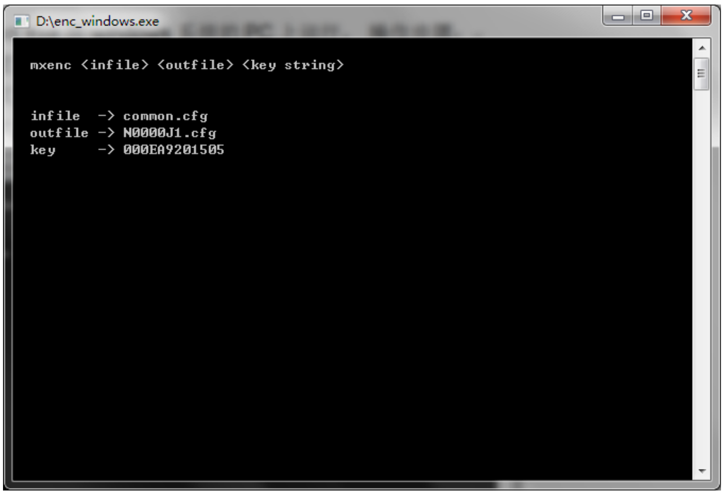
Step 3 Start **enc_windows.exe**, and enter the name of the unencrypted file, the name of the encrypted file, and the MAC address of the device in sequence according to prompts.

- When the system displays the prompt "infile", enter the name of the unencrypted file (such as **common.cfg**) and then press **Enter**.
- When the system displays the prompt "outfile", enter the name of the encrypted file (such as **N0000J1.cfg**) and then press **Enter**.

  The encrypted file must be named in accordance with the formats described in Section 3.1 Configuration Files. The name of the unencrypted file does not need to follow these formats.
- When the system displays the prompt "key", enter the MAC address of the device.

  The input MAC address must not contain ":". For example, if the MAC address is 00:0E:A9:20:15:05, the input MAC address should be 000EA9201505.

Figure 3-4 Starting the Encryption Tool on a Windows PC



```
mxenc <infile> <outfile> <key string>


infile  -> common.cfg
outfile -> N0000J1.cfg
key     -> 000EA9201505
```

Note

- The encrypted file must be named in accordance with the formats described in Section 3.1 Configuration Files. The name of the unencrypted file does not need to follow these formats.
- The input MAC address must not contain ":". For example, if the MAC address is 00:0E:A9:20:15:05, the input MAC address should be 000EA9201505.

4 Obtaining an ACS URL

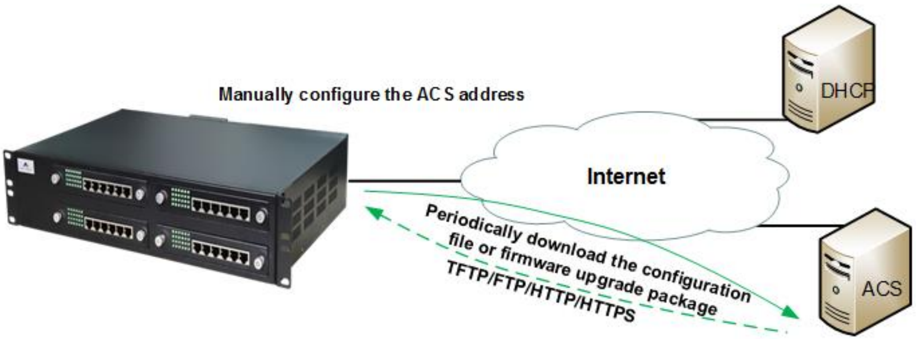
A device can download a configuration file after obtaining an ACS URL.

The following uses MX series as an example.

4.1 Manually Configuring the ACS URL

The device will automatically obtain the configuration file and firmware from the manually configured ACS URL.

Figure 4-1 Manual configuration


Manually configure the ACS address
Internet
DHCP
ACS
Periodically download the configuration file or firmware upgrade package
TFTP/FTP/HTTP/HTTPS

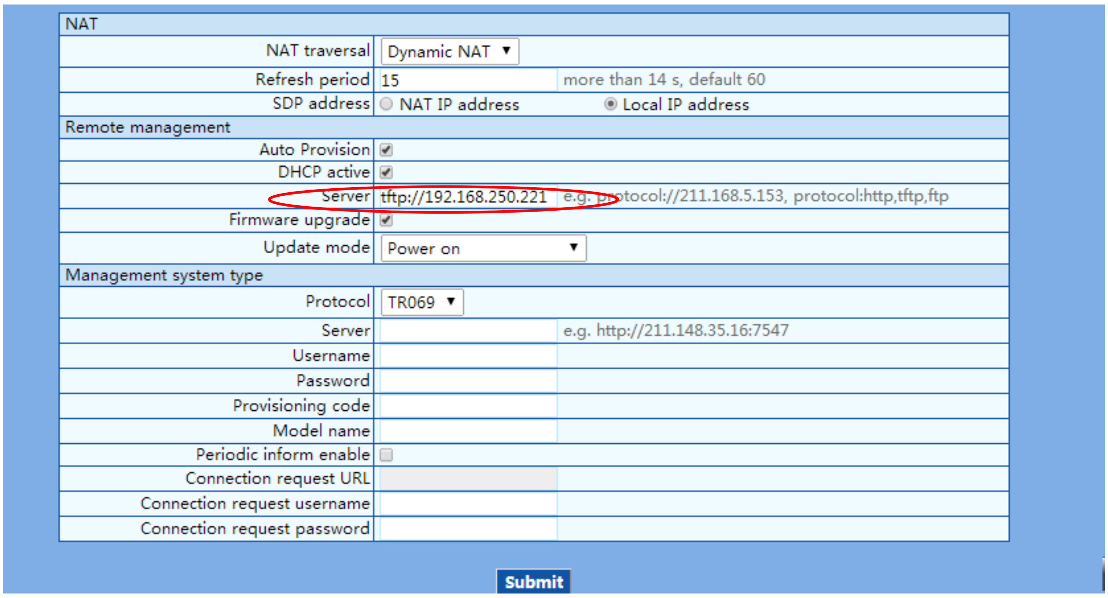
Step 1 Log into the Web GUI of the device, click **Advanced** > **System**, and select **Auto Provision**.

Table 4-1 ACS URL format

Server type	URL format
TFTP server	tftp://ACS URL
FTP server	ftp://ACS URL
HTTP server	http://ACS URL
HTTPS server	https://ACS URL

Configure the ACS URL in the **Server** text box in one of the formats above. When an FTP, HTTP or HTTPS server is used, it is also required to enter the preset **User name** and **Password** (If preset **User name** and **Password** text boxes are not displayed on the ACS server, enter them manually in the URL text box in this format: http://User name:password@Server address). Then click **Submit**.

Figure 4-2 Manually Configuring the ACS URL



NAT		
NAT traversal	Dynamic NAT ▼	
Refresh period	15	more than 14 s, default 60
SDP address	○ NAT IP address	● Local IP address
Remote management		
Auto Provision	☑	
DHCP active	☑	
Server	tftp://192.168.250.221	e.g. protocol://211.168.5.153, protocol:http,tftp,ftp
Firmware upgrade	☑	
Update mode	Power on ▼	
Management system type		
Protocol	TR069 ▼	
Server		e.g. http://211.148.35.16:7547
Username		
Password		
Provisioning code		
Model name		
Periodic inform enable	□	
Connection request URL		
Connection request username		
Connection request password		

Note

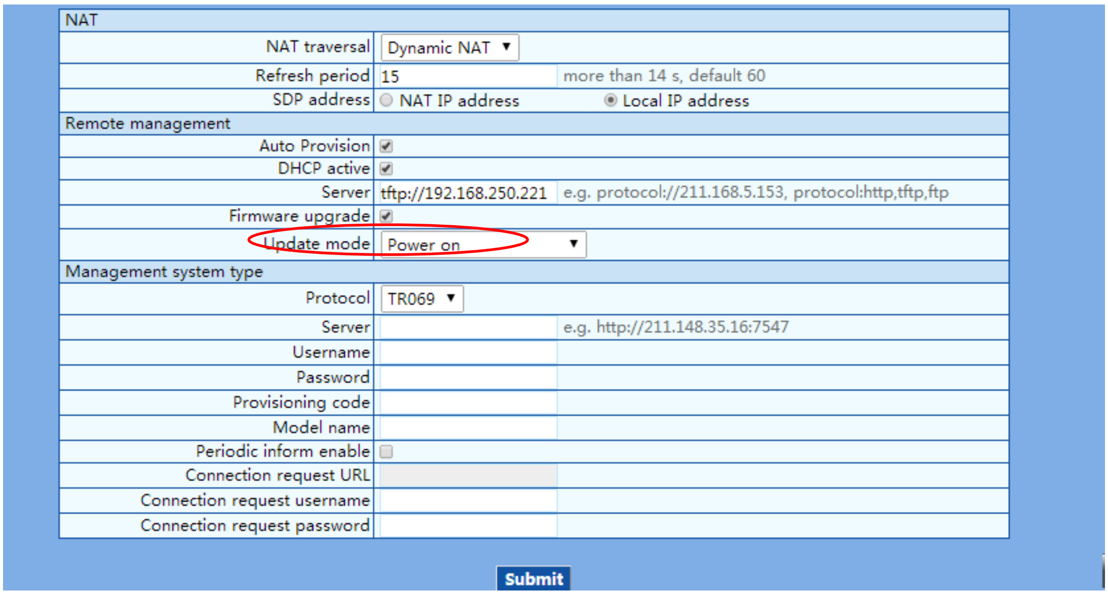
- The ACS URL can be in IP address or domain name format. If the ACS URL is in domain name format, the DNS server needs to be configured.
- The protocol header **tftp**, **ftp**, **http** or **https** must be in lower case.
- If the device is configured to obtain the ACS URL by using both DHCP and manual configuration, the ACS URL carried by DHCP is first obtained.

Step 2 Select **Firmware upgrade** (if a firmware upgrade is not required, do not select this option), and select an update mode instead.

Two update modes are available:

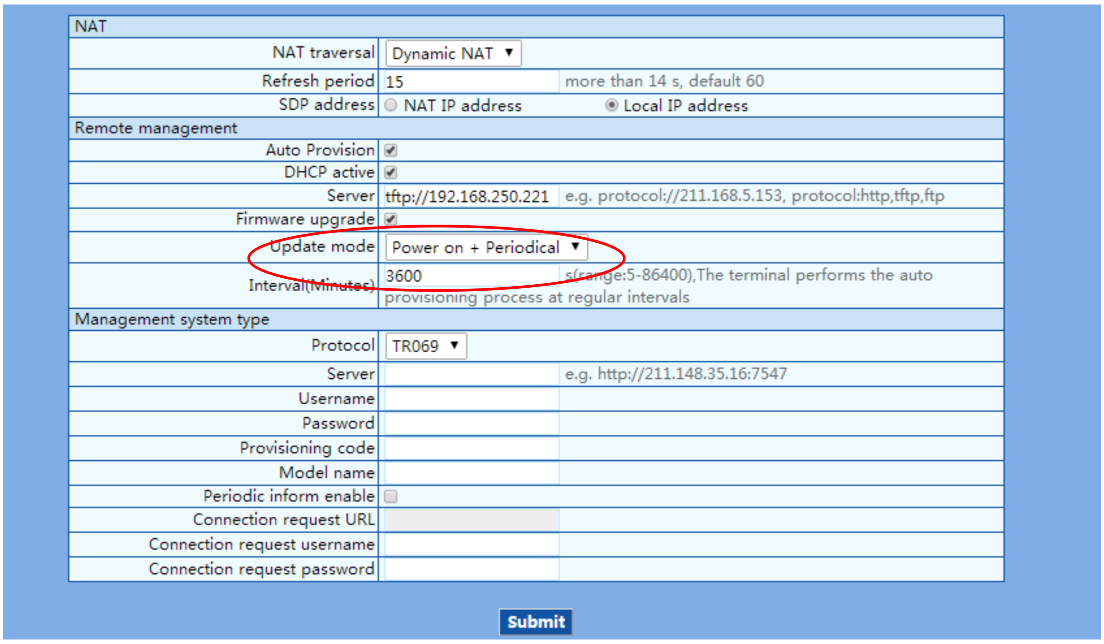
- **Power on**: The device detects whether to upgrade its configuration and firmware using those on the ACS only when the device is started.
- **Power on + Periodical**: Upon powering-on, the device detects whether to upgrade its configuration and firmware using those on the ACS. The device will also periodically (at a specific update interval) detect whether to upgrade its configuration and firmware using those on the ACS. If this mode is used, the update interval needs to be specified.

Figure 4-3 Setting the Update Mode (to Power on)



NAT		
NAT traversal	Dynamic NAT ▼	
Refresh period	15	more than 14 s, default 60
SDP address	○ NAT IP address	● Local IP address
Remote management		
Auto Provision	☑	
DHCP active	☑	
Server	tftp://192.168.250.221	e.g. protocol://211.168.5.153, protocol:http,tftp,ftp
Firmware upgrade	☑	
Update mode	Power on ▼	
Management system type		
Protocol	TR069 ▼	
Server		e.g. http://211.148.35.16:7547
Username		
Password		
Provisioning code		
Model name		
Periodic inform enable	□	
Connection request URL		
Connection request username		
Connection request password		

Figure 4-4 Setting the Update Mode (to Power on + Periodical)



NAT		
NAT traversal	Dynamic NAT ▼	
Refresh period	15	more than 14 s, default 60
SDP address	○ NAT IP address	● Local IP address
Remote management		
Auto Provision	☑	
DHCP active	☑	
Server	tftp://192.168.250.221	e.g. protocol://211.168.5.153, protocol:http,tftp,ftp
Firmware upgrade	☑	
Update mode	Power on + Periodical ▼	
Interval(Minutes)	3600	s(range:5-86400),The terminal performs the auto provisioning process at regular intervals
Management system type		
Protocol	TR069 ▼	
Server		e.g. http://211.148.35.16:7547
Username		
Password		
Provisioning code		
Model name		
Periodic inform enable	□	
Connection request URL		
Connection request username		
Connection request password		

Note

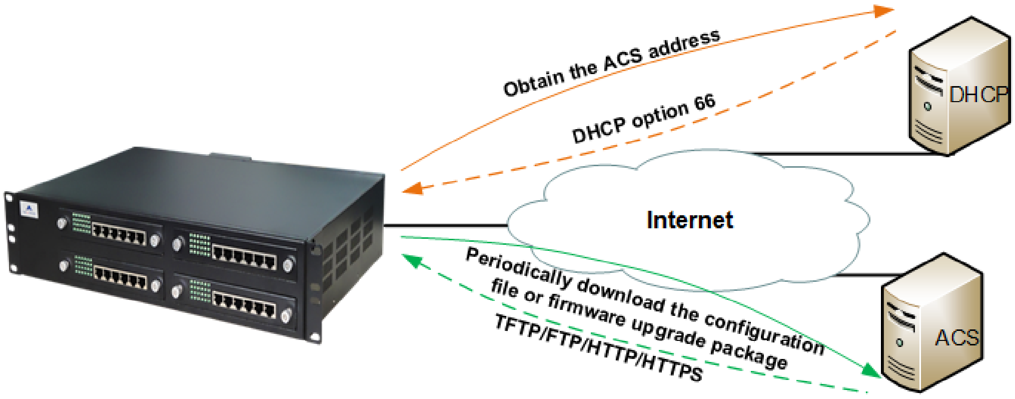
- To detect the firmware upgrade package, the *FIRM_URL* parameter needs to be configured in the configuration file on the ACS. For details, see Table 3-2.
- After the configuration file is updated, the device will restart within 40 seconds.
- Firmware updating involves a firmware update and device restart, and takes about 3 minutes.
- After receiving the instruction (**check-sync** carried in **notify**), it can be used to control a device restart to trigger the auto configuration process.

4.2 Obtaining an ACS URL via DHCP option 66

When the IP address of device is obtained by using DHCP, the DHCP option 66 address on the DHCP server can be set to the ACS URL. The device will automatically detect DHCP option 66 to obtain the ACS URL. The ACS carried in DHCP option 66 can only be a TFTP server.

If the existing DHCP server does not support DHCP option 66, you can establish a DHCP server for configuration.

Figure 4-5 Auto discovery via DHCP option 66

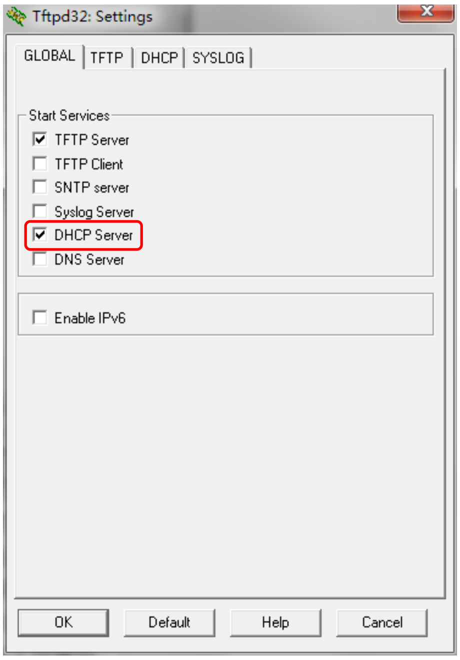

Obtain the ACS address
DHCP option 66
DHCP
Internet
Periodically download the configuration file or firmware upgrade package
TFTP/FTP/HTTP/HTTPS
ACS

Note

- If you enable **Obtain ACS address via DHCP option 66** and also configure the ACS URL on the interface, the device attempts to obtain the ACS URL (in option 66) from a message sent by the DHCP server at first. If this operation fails, the ACS URL manually configured on the device is read instead.

Step 1 Install the DHCP server software (Tftpd32 is used as an example). Start Tftpd32, click **Settings**, select the **GLOBAL** tab, and tick **DHCP Server**.
Start Tftpd32, click **Settings**, click the **GLOBAL** tab, and select **DHCP Server**.

Figure 4-6 GLOBAL Configuration Interface for Tftpd32

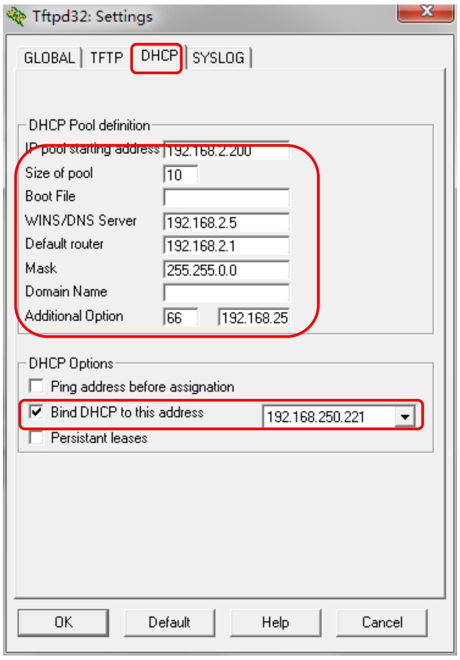


Start Services
☑ TFTP Server
☐ TFTP Client
☐ SNTP server
☐ Syslog Server
☑ DHCP Server
☐ DNS Server

☐ Enable IPv6

Step 2 Click **Settings**, and click the **DHCP** tab. Then configure relevant parameters, and click **OK**.

Figure 4-7 DHCP Configuration Interface for Tftpd32



DHCP Pool definition

IP pool starting address	192.168.2.200
Size of pool	10
Boot File	
WINS/DNS Server	192.168.2.5
Default router	192.168.2.1
Mask	255.255.0.0
Domain Name	
Additional Option	66 192.168.25

DHCP Options

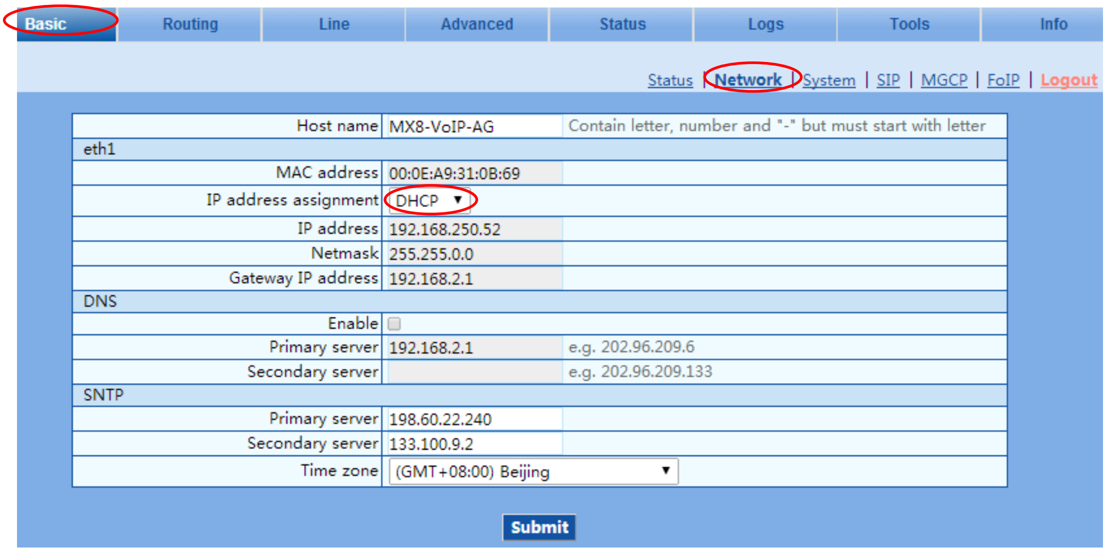
☐ Ping address before assignation
☑ Bind DHCP to this address 192.168.250.221
☐ Persistant leases

Table 4-2 DHCP Configuration Parameters of Tftpd32

Parameter	**Description**
IP pool starting address	Available starting address.
Size of pool	Total number of available addresses.
WIN/DNS Server	DNS server address.
Default router	Default router address.
Mask	Subnet mask that corresponds to the available address segment.
Additional Option	Extended DHCP option. You need to set this parameter to 66, and set the address beside it to the address of the TFTP server.
Bind DHCP to this address	Select this option to specify the IP address of the DHCP server.

Step 3 Log into the Web GUI of the device, choose **Basic** > **Network**, select DHCP from the **IP address assignment** drop-down box, and then click **Submit**.

Figure 4-8 Network Configuration Interface



Host name	MX8-VoIP-AG	Contain letter, number and "-" but must start with letter
eth1		
MAC address	00:0E:A9:31:0B:69	
IP address assignment	DHCP ▼	
IP address	192.168.250.52	
Netmask	255.255.0.0	
Gateway IP address	192.168.2.1	
DNS		
Enable	□	
Primary server	192.168.2.1	e.g. 202.96.209.6
Secondary server		e.g. 202.96.209.133
SNTP		
Primary server	198.60.22.240	
Secondary server	133.100.9.2	
Time zone	(GMT+08:00) Beijing ▼	

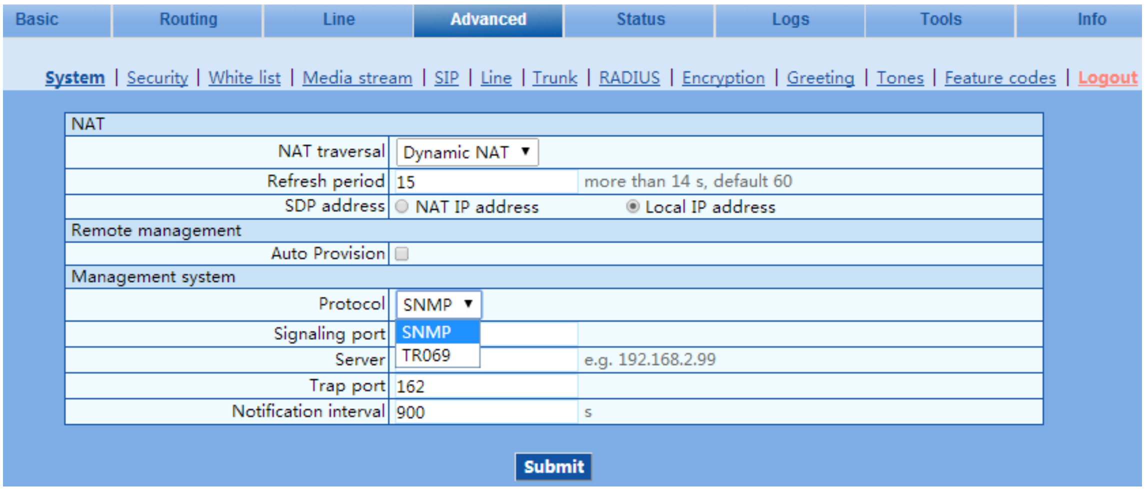
Note

- The GUI display may vary according to different device models. Configuration sequences and items, however, are almost the same as described in this document.

Step 4 Click **Advanced** > **System**, select **Auto provision**. Then select **DHCP** and **Firmware upgrade** (if a firmware upgrade is not required, do not select this option), and select an update mode. Two update modes are available:

- **Power on**: The device detects whether to upgrade its configuration and firmware using those on the ACS only when the device is started.
- **Power on + Periodical**: Upon powering-on, the device detects whether to upgrade its configuration and firmware using those on the ACS. The device will also periodically (at a specific update interval) detect whether to upgrade its configuration and firmware using those on the ACS. If this mode is used, the update interval needs to be specified.

Figure 4-9 Auto provision Configuration Interface


Basic
Routing
Line
Advanced
Status
Logs
Tools
Info
System | Security | White list | Media stream | SIP | Line | Trunk | RADIUS | Encryption | Greeting | Tones | Feature codes | Logout
SNMP
TR069
Submit

NAT		
NAT traversal	Dynamic NAT ▼	
Refresh period	15	more than 14 s, default 60
SDP address	○ NAT IP address	● Local IP address
Remote management		
Auto Provision	□	
Management system		
Protocol	SNMP ▼	
Signaling port		
Server		e.g. 192.168.2.99
Trap port	162	
Notification interval	900	s

Note

- If the ACS URL carried in DHCP option 66 is in domain name format, the DNS server needs to be configured. Please click **Basic** > **Network** to configure the DNS server.
- To detect the firmware upgrade package, the *FIRM_URL* parameter needs to be configured in the configuration file on the ACS. For details, see Table 3-2.
- The configuration file upgrade takes effect immediately after the device restarts, and takes about 40 seconds.
- Firmware updates involve a firmware update and device restart, and takes about 3 minutes.

4.3 Obtaining an ACS URL via Redirection Mechanism

In general, the device is configured to contact a default ACS upon powering up. The default ACS may be established by manufacturer, or included in manufacturer's provisioning system. If the service provider establishes an ACS for their own management, they can select one of the following methods:

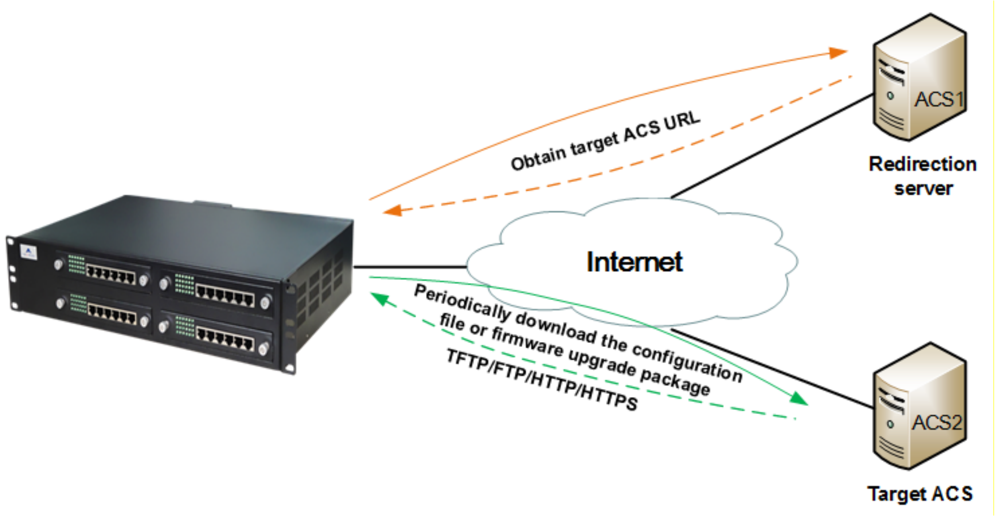
1. Manually configure the URL of service provider's own ACS on the device, or
2. Use redirection mechanism, i.e., embed the URL information into default ACS which will redirect the devices to visit the service provider's own ACS upon powering up. For details:

(1) Use the default ACS (ACS1) as the server for redirection and configure the URL of ACS1 on the device;

(2) The service provider places the configuration file on their own ACS (ACS2);

(3) On ACS1, place a general configuration file with the redirection parameter GEN_URL pointing to ACS2.

Figure 4-10 Obtaining an ACS URL via redirection mechanism



Based on the type of the target server that is pointed to, the value of a GEN_URL can be one of the followings:

Table 4-3 GEN_URL value

	Type of service provider's server	Value
1	TFTP server	tftp://Server address/**Redirection filename**
2	FTP server	ftp://Username:password@Server address/**Redirection filename**
3	HTTP server	http://Username:password@Server address/**Redirection filename**
4	HTTPS server	https://Username:password@Server address/**Redirection filename**

Note

- It is recommended to name the redirection filename as $MA.cfg, which indicates the file corresponding to the MAC address of the device. The redirection filename may also be a user-defined file.

The device operates the auto provision with redirection mechanism as follows:

1. The device contacts ACS1 automatically upon powering up;
2. The device downloads general configuration file with ACS2 URL from ACS1;
3. The device points to ACS2 to download the device configuration file;
4. Apply the configuration settings.

Note

- When the same parameters are included in different configuration files, the parameters are validated according to this priority: Redirection file > MAC-addressed file > General configuration file.

Appendix 1: Operation Instance

Operation steps:

Step 1 Prepare configuration files based on the specific application scenario.

Prepare the configuration files based on the specific application scenario..

For details about configuration file naming, see Section 3.1 Configuration Files.

Step 2 Prepare the server. See Section 2 Establishing the ACS.

Step 3 Configure a device so that the device can obtain an ACS server address link. See Section 4 Obtaining an ACS URL.

Step 4 Start the device.

Example of Carrying the ACS URL in DHCP

- Change the registration server address of the HX4 device to 192.168.2.100 remotely through the ACS.
- The HX4 network automatically downloads the firmware upgrade package **MX.J1.1.1.3.327_7.E0.03.tar.gz**.

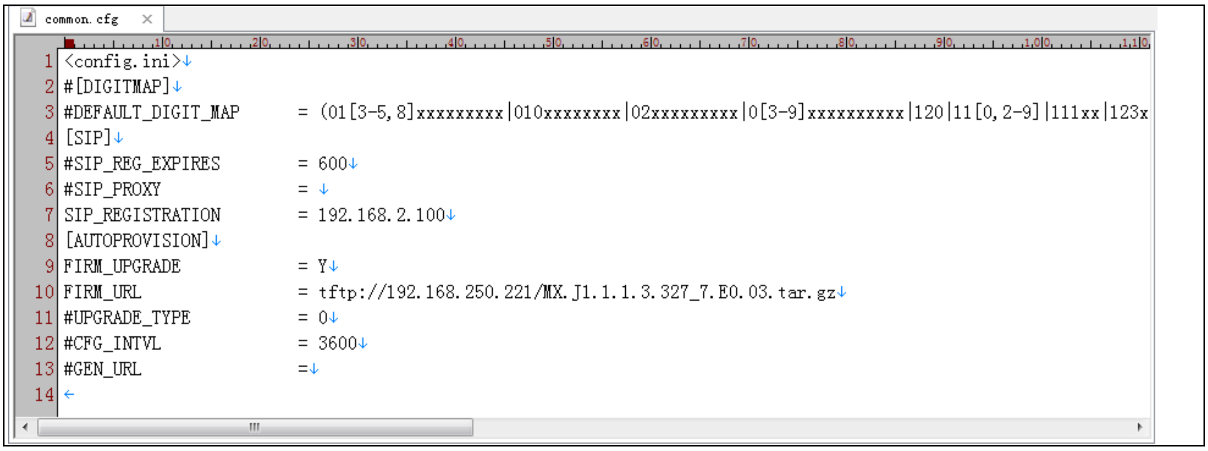
Operation steps:

Step 1 Establish a TFTP server, and set the root directory of the server. It is assumed that the address of the TFTP server is 192.168.250.221.

Step 2 Establish a DHCP server, enable option 66 on the DHCP server, and set Option 66 to **tftp://192.168.250.221**.

Step 3 Download the configuration file **common.cfg** from Appendix 2: Configuration File Template in this document, and then modify the configuration file.

Add "#" to the beginning of each unnecessary parameter node row and parameter row, and set the parameters *SIP_RGISTRATION*, *FIRM_UPGRADE*, and *FIRM_URL*. Modify the configuration file to the effect shown in the following figure.



```
<config.ini>
#[DIGITMAP]
#DEFAULT_DIGIT_MAP      = (01[3-5,8]xxxxxxxxx|010xxxxxxxx|02xxxxxxxxx|0[3-9]xxxxxxxxxx|120|11[0,2-9]|111xx|123x
[SIP]
#SIP_REG_EXPIRES        = 600
#SIP_PROXY              = 
SIP_REGISTRATION        = 192.168.2.100
[AUTOPROVISION]
FIRM_UPGRADE            = Y
FIRM_URL                = tftp://192.168.250.221/MX.J1.1.1.3.327_7.E0.03.tar.gz
#UPGRADE_TYPE           = 0
#CFG_INTVL              = 3600
#GEN_URL                =

```

Step 4 Encrypt the configuration file **common.cfg** as **N0000J1.cfg** using the encryption tool mxenc, and place the encrypted configuration file along with **MX.J1.1.1.3.327_7.E0.03.tar.gz** into the root directory of the TFTP server.

Step 5 Start the HX4. The HX4 automatically downloads the configuration file, and performs a firmware upgrade.

Appendix 2: Configuration File Template

General Configuration File Template

common1.cfg is applicable to HX4/MX8/MX60/MX100E/MX100G/MX120/OM12/OM80/OM200 devices.

common2.cfg is applicable to HX4E/MX8A/WROC2000/WROC3000/OM20/OM50 devices.

Common2.cfg Common1.cfg

MAC-addressed Configuration File Template

MAC_oriented.cfg