

# M2M CDMA Router

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TR-069 Whitepaper

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*Table 1 - Document Revision History*



Note: Before performing the instructions in this guide, please ensure that you have the latest firmware version installed on your router. Visit <http://www.netcommwireless.com/product/m2m/nwl-11> to download the latest firmware.

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# Introduction

The NetComm Wireless M2M CDMA Router supports the Technical Report 069 (TR-069) standard published by the Broadband Forum for remote customer-premises equipment (CPE) administration and management.

The TR-069 standard was developed for automatic configuration of CPE devices such as modems, routers, gateways, set-top boxes, and VoIP-phones with Auto Configuration Server (ACS). An increasing number of network carriers and ISPs are using TR-069 ACS to mass deploy, administer and manage their TR-069-ready CPE remotely.

The purpose of this whitepaper is to demonstrate how to establish a connection between an M2M CDMA Router and an ACS server and how to perform a firmware upgrade remotely via TR-069 on M2M CDMA Routers.

Other TR-069 operations are described in a separate document including:

- ⚙ GetParameterNames : Retrieve list of supported parameter names from the device.
- ⚙ GetParameterValues: Retrieve one or multiple the current monitoring parameters values.
- ⚙ SetParameterValues: Sets the value of one or multiple parameters.
- ⚙ GetParameterAttributes: Retrieves the current monitoring (Active/Passive/None) set on a parameter or multiple parameters.
- ⚙ SetParameterAttributes: Sets attributes of one or multiple parameters
- ⚙ Retrieve Device System Log from ACS Server
- ⚙ Reboot: reboot CPE remotely from ACS Server
- ⚙ Factory Reset: restore CPE to factory default settings from ACS Server

There are many options available for selecting an Auto Configuration Server including commercial and open source offerings. In this white paper, for the purpose of demonstrating how to perform a device firmware upgrade via TR-069, the Netmania Auto Configuration Server was chosen. The exact procedures and steps may vary depending on your chosen ACS. For privacy reasons, the login credentials to the management URL of the ACS Server in this white paper has been replaced with <http://xxx.xxx.xxx/management/> and the CPE connection URLs were replaced with <http://xxx.xxx.xxx/cpe.php>. The ACS user name, password and CPE TR-069 Connection Request user name and password used in this white paper are for test purposes only.

## Considerations with TR-069

When configuring your M2M CDMA for TR-069, you should ensure that the following considerations are addressed:

- ⚙ The device must have IP address access to the ACS server which may pose a problem on some private networks
- ⚙ The device must have a publicly routable IP address for connection requests to work

## TR-069 Remote CPE Management Connection Diagram

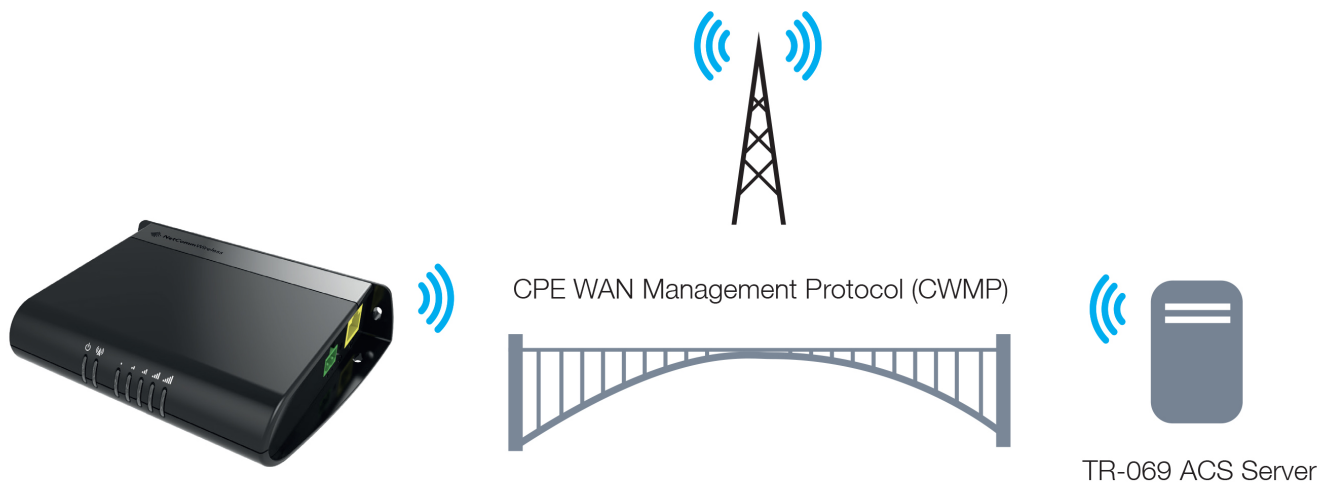


Figure 1: M2M CDMA Router TR-069 Remote CPE Management

## Establishing a connection between an M2M CDMA Router and an Auto Configuration Server

Before establishing the connection between the M2M CDMA Router and the ACS server, please check the following:

- ⚙️ Ensure the relevant version of firmware is loaded in the M2M CDMA Router that supports TR-069
- ⚙️ Ensure the M2M CDMA Router is loaded with a test SIM that supports an accessible WAN IP address. In this white paper, the SIM used in the M2M CDMA Router has a public IP address.
- ⚙️ You have the ACS management URL, administrator user name and password for remote management
- ⚙️ The M2M CDMA Router TR-069 device product class name and serial number (SN) is registered in the ACS
- ⚙️ You have the M2M CDMA Router ACS CPE connection URL, ACS user name and password
- ⚙️ You have the M2M CDMA Router CPE TR-069 Connection Request user name and password
- ⚙️ You have read the device manual and know how to connect and make device configuration via its web management interface

## TR-069 ACS Server Configuration

There are many options available for selecting an Auto Configuration Server including commercial and open source offerings. In this white paper, for the purpose of demonstrating how to perform a device firmware upgrade via TR-069, the Netmania Auto Configuration Server was chosen. The exact procedures and steps may vary depending on your chosen ACS. For privacy reasons, the login credentials to the management URL of the ACS Server in this white paper has been replaced with <http://xxx.xxx.xxx/management/> and the CPE connection URLs were replaced with <http://xxx.xxx.xxx/cpe.php>. The ACS user name, password and CPE TR-069 Connection Request user name and password used in this white paper are for test purposes only.

Prior to configuring the M2M CDMA Router, the device product class name and serial number must be registered on the Auto Configuration Server.

### Login to the ACS management URL

ACS server management URL: <http://xxx.xxx.xxx/management/>

Username: xxxx

Password: xxxx

### Create the Device Model on ACS server

1. Navigate to **Home > Manage Device Types**

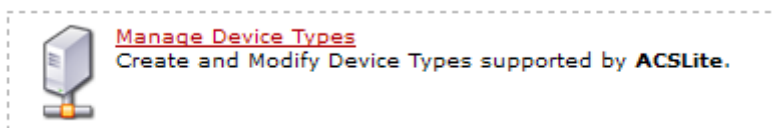


Figure 2: Manage Device Types option

2. Navigate to **Home > Manage Device Models > Add Device Type**

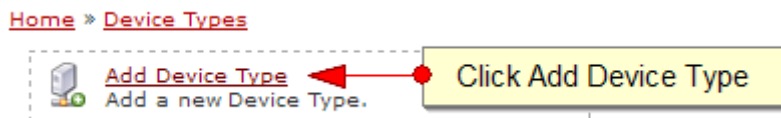


Figure 1: Add Device Type link

When creating a device model on the ACS, the OUI and the product class need to match the settings shown in Figure 3 below.

[Home](#) » [Device Types](#) » **Add Device Type**

Select the appropriate Data Model and enter the information requested below.  
Fields marked with \* are REQUIRED.

|                                    |   |
|------------------------------------|---|
| <b>Manufacturer</b>                | <input type="text" value="NetComm Wireless"/>                         |
| <b>OUI *</b>                       | <input type="text" value="006064"/>                                   |
| <b>ProductClass</b>                | <input type="text" value="NWL11 Series"/>                             |
| <b>Description</b>                 | <input type="text" value="NetComm Wireless - 006064 - NWL11 Series"/> |
| <b>Data Model</b>                  | <input type="text" value="Blank InternetGatewayDevice Data Model"/>   |
| <b>HTTP Authentication Method</b>  | <input type="text" value="Use System Default"/>                       |
| <b>HTTPS Authentication Method</b> | <input type="text" value="Use System Default"/>                       |

**Create Device Type**

Figure 2: NetComm Wireless M2M CDMA product class name

### Add the Device on the ACS server

1. Navigate to **Home > Manage Devices > Add Device** and fill in the add device form, then click **Manage Devices**.

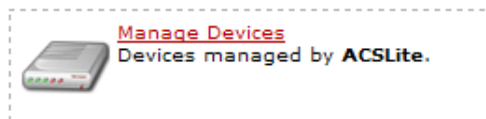


Figure 3: Register TR-069 CPE serial number on ACS

2. Click the **Add Device** link.



Figure 4: Add Device link

The serial number is the last 6 digits of the MAC address of the device.

[Home](#) » [Devices](#) » **Add Device**

Select Device Type and enter the information requested below.  
All Fields are REQUIRED.

|                                  |  |
|----------------------------------|--|
| <b>Device</b>                    | <input type="text" value="006064 - NWL11 Series"/> |
| <b>Serial #</b>                  | <input type="text" value="9F1403"/>                |
| <b>Description</b>               | <input type="text" value="NWL11"/>                 |
| <b>connectionrequestusername</b> | <input type="text" value="cpe"/>                   |
| <b>connectionrequestpassword</b> | <input type="text" value="cpe"/>                   |
| <b>username</b>                  | <input type="text" value="acs"/>                   |
| <b>password</b>                  | <input type="text" value="acs"/>                   |

**Add Device**

Figure 5: Adding the device to the ACS Server

To add multiple devices at once:

1. Click **Import Device(s)**



2. Click the **Browse** button and open a CSV file which is formatted as illustrated below:

Home » Devices » **Import Device(s)**

Import File

**NOTE:** Maximum filesize is **approximately 15MB**.

**Import Devices**

Click Browse and open CSV file formatted as described below

**Example CSV file format:**

**All fields must be specified in the header line as below**

**Optional:** description - values can be empty, but column names must still be present.

```
serialnumber,oui,productclass,description,connectionrequestusername,connectionrequestpassword,username,password
"dc8AB","000CC3","ACSLITE","ACSLite Device","cruname","crpassword","cpe","cpe"
"d8d0B","000CC3","ACSLITE","","cruname","crpassword","cpe","cpe"
"81B0d","00D09E","ACSLITE","ACSLite Device","cruname","crpassword","cpe","cpe"
"Ad1c8","000CC3","ACSLITE","ACSLite Device","cruname","crpassword","cpe","cpe"
"1c0BA","000CC3","ACSLITE","","cruname","crpassword","cpe","cpe"
```



## TR-069 CPE Configuration

By default, the M2M CDMA Router is not pre-configured with active TR-069 client settings and the TR-069 feature is disabled.

To test the TR-069 features, you need to manually login via the router's Ethernet interface to enable the TR-069 feature and configure it with the relevant TR-069 client settings.

An example of the M2M CDMA Router TR-069 client configuration is shown in Figure 8.

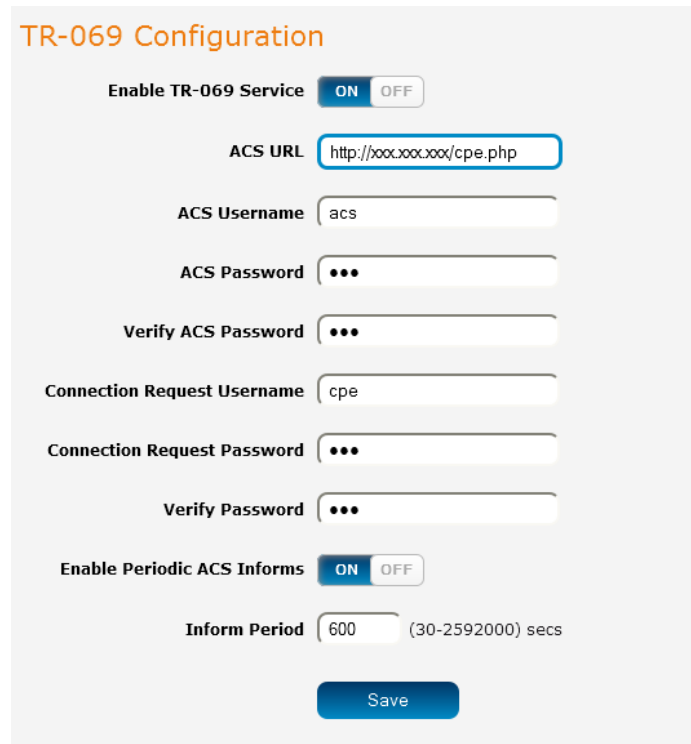


Figure 6: An example MachineLink3G Router TR-069 client configuration

The Auto Configuration Server relies on the router's first device boot up or initial inform to learn the router's WAN IP address. This can be triggered by manually disabling and enabling the CPE TR-069 configuration or waiting for the periodic inform message from the CPE to the ACS server.

After the inform period has elapsed (600 seconds by default), the Last Contacted field shows the time of the last inform message indicating that the M2M CDMA Router is now part of the group and communicating with the ACS server.



Note: The ACS uses the last 6 characters of the device MAC address as the serial number.

| Serial #               | Type                | Description | Created          | First Contacted  | Last Contacted   | Action  |
|------------------------|---------------------|-------------|------------------|------------------|------------------|---|
| <a href="#">9F1403</a> | 006064-NWL11 Series | NWL11       | 2013-06-11 08:35 | 2013-06-11 08:38 | 2013-06-17 02:11 |    |

Figure 7: First inform time stamp

The device inform message will contain the device's current WAN IP address. This is viewable by clicking on the **Device Data** tab.

| Serial #               | Type                | Description | Created          | First Contacted  | Last Contacted   | Action  |
|------------------------|---------------------|-------------|------------------|------------------|------------------|---|
| <a href="#">9F1403</a> | 006064-NWL11 Series | NWL11       | 2013-06-11 08:35 | 2013-06-11 08:38 | 2013-06-17 02:11 |    |

**Click the Serial # to view more information**

[Home](#) » [Devices](#) » **Manage Device :: 9F1403** [ 006064-NWL11 Series ]

Information | **Device Data** | Device | Action Log

Parameters cached for this Device.

Figure 8: Viewing the device data tab

The TR-069 ACS Server and TR-069 M2M Router CPE connection has now been established. You may now start to perform a device firmware upgrade remotely via TR-069.

```

- ManagementServer
  ConnectionRequestURL http://166.239.219.241:7547/5F5FDE5D2A3D6473
                        2013-06-17 02:20
  ParameterKey         
                        2013-06-17 02:20
  
```

Figure 9: ACS learns CPE WAN IP address

# M2M CDMA Remote Firmware Upgrade/Downgrade Using TR-069

## Preparing the device firmware

Step 1 - Upload the device firmware to an external FTP/HTTP Server.

In this example, the following firmware file links are used:

- ☞ [http://xxx.xxx.x.x/ntc\\_nwl11\\_1.10.28.43604.cdi](http://xxx.xxx.x.x/ntc_nwl11_1.10.28.43604.cdi) for main system image
- ☞ [http://xxx.xxx.x.x/ntc\\_nwl11\\_1.10.28.43604\\_r.cdi](http://xxx.xxx.x.x/ntc_nwl11_1.10.28.43604_r.cdi) for recovery system image

**i** Note: You should use your active FTP/HTTP server link and relevant device firmware for creating device firmware download links on the Auto Configuration Server.

The M2M CDMA Router holds two firmware image files, one is the recovery image file and the other is the main system image file. When performing a device firmware upgrade, you should upgrade both firmware images, starting with the recovery image first (named with the '\_r' suffix) and then the main system image. Instructions on how to transfer device firmware to an FTP/HTTP server are not covered in this white paper.

Step 2 - Create firmware 'Download' entries.

Navigate to **Home > Manage Download > Add Download** to add two 'Download' entries. See Figure 10 and Figure 11 for details.

**Home > Downloads > Add Download**

Select Device Type and enter the information requested below.  
**All fields marked with \* are REQUIRED.**

|                       |   |
|-----------------------|---|
| <b>Device *</b>       | <input type="text" value="006064 - NWL11 Series"/>  |
| <b>Filetype *</b>     | <input type="text" value="1 Firmware Upgrade Image"/>   |
| <b>Name *</b>         | <input type="text" value="NWL-11 FW1.10.28.43604_r Reco"/>  |
| <b>Description</b>    | <input type="text"/>  |
| <b>url *</b>          | <input type="text" value="http://xxx.xxx.x.x/ntc_nwl11_1.10."/><br>http://<host>:<port>/<path>/<filename> |
| <b>username</b>       | <input type="text"/>  |
| <b>password</b>       | <input type="text"/>  |
| <b>filesize *</b>     | <input type="text" value="0"/> bytes  |
| <b>targetfilename</b> | <input type="text"/>  |
| <b>delaysecs</b>      | <input type="text" value="0"/> seconds  |
| <b>successurl</b>     | <input type="text"/><br>http://<host>:<port>/<path>/<filename>  |
| <b>failureurl</b>     | <input type="text"/><br>http://<host>:<port>/<path>/<filename>  |

**Add Download**

Figure 10: Create firmware link for M2M CDMA 1.10.28.43604 recovery system image

[Home](#) » [Downloads](#) » **Add Download**

Select Device Type and enter the information requested below.  
**All fields marked with \* are REQUIRED.**

**Device \***

**Filetype \***

**Name \***

**Description**

**url \***   
http://<host>:<port>/<path>/<filename>

**username**

**password**

**filesize \***  bytes

**targetfilename**

**delaysecs**  seconds





**successurl**   
http://<host>:<port>/<path>/<filename>

**failureurl**   
http://<host>:<port>/<path>/<filename>

**Add Download**

Figure 11: Create firmware link for M2M CDMA 1.10.28.43604 main system image

Once the two firmware file links are created, they will be displayed in the **Home > Manage Download** summary page on the ACS server.

|        |              |                                    |  |   |   |                          |   |
|--------|--------------|------------------------------------|--|---|---|--------------------------|---|
| 006064 | NWL11 Series | <a href="#">NWL-11_FW_main</a>     | http://xxx.xxx.x.x/ntc_nwl11_1.10.28.43604.cdi   | 0 | 0 | 1 Firmware Upgrade Image |   |
| 006064 | NWL11 Series | <a href="#">NWL-11_FW_recovery</a> | http://xxx.xxx.x.x/ntc_nwl11_1.10.28.43604_r.cdi | 0 | 0 | 1 Firmware Upgrade Image |   |

### Queuing Device Firmware 'Download'

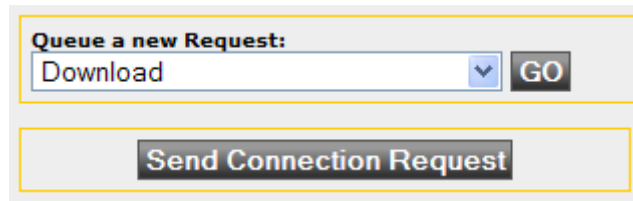
To perform firmware upgrades or downgrades on the router via TR-069, navigate to the ACS server's management URL: **Home > Manage Devices**, and select the serial number of the device for which to perform a firmware upgrade or downgrade.

#### Step 1 - Queue firmware download task

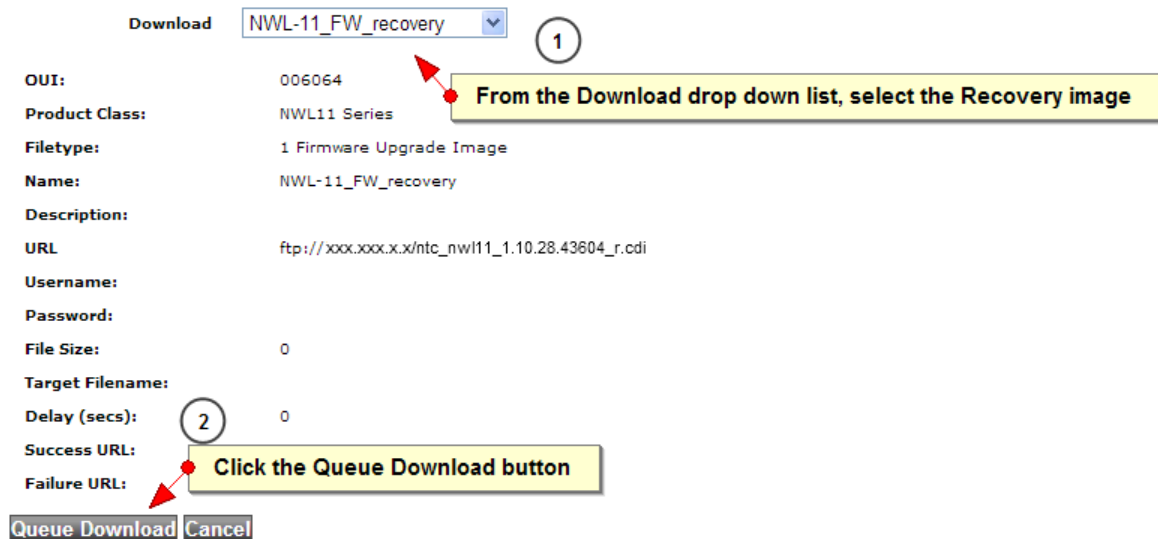
Queue the firmware download task by selecting **Download** on the **Queue a new Request** drop down list, then click on **Go**. The New Request (Download) page is displayed. Queue a firmware download task by selecting the relevant link and click **Queue Download**. See Figure 12 for details.



Note: Both device firmware upgrade and firmware downgrade tasks make use of the 'Download' action button on the ACS Server.



[Home](#) > [Devices](#) > [Manage Device \(9F1403\)](#) > [New Request \(Download\)](#)



**Download** NWL-11\_FW\_recovery 1

**OUI:** 006064

**Product Class:** NWL11 Series

**Filetype:** 1 Firmware Upgrade Image

**Name:** NWL-11\_FW\_recovery

**Description:**

**URL:** ftp://xxx.xxx.x.x/ntc\_nwl11\_1.10.28.43604\_r.cdi

**Username:**

**Password:**

**File Size:** 0

**Target Filename:**

**Delay (secs):** 2 0

**Success URL:**

**Failure URL:**

**Queue Download** **Cancel**

**From the Download drop down list, select the Recovery image**

**Click the Queue Download button**

Figure 12: Queuing the Recovery Image

Home » Devices » Manage Device (9F1403) » New Request (Download)

Download NWL-11\_FW\_main - main 1

**OUI:** 006064

**Product Class:** NWL11 Series

**Filetype:** 1 Firmware Upgrade Image

**Name:** NWL-11\_FW\_main

**Description:** main

**URL:** ftp://xxx.xxx.x.x/ntc\_nwl11\_1.10.28.43604.cdi

**Username:**

**Password:**

**File Size:** 0

**Target Filename:**

**Delay (secs):** 0

**Success URL:**

**Failure URL:**

From the Download drop down list, select the Main image

2

Click the Queue Download button

Queue Download

Cancel

Figure 13: Queuing the Main image

Step 2 - Execute the firmware 'Download' task.  
 Click on **Send Connection Request** to execute the queue tasks.

**Requests** | Device History

Search:

| Queued           | Method   | Originator | Action |
|------------------|----------|------------|--------|
| 2013-02-15 03:47 | Download | user       |        |
| 2013-02-15 03:54 | Download | user       |        |

Showing 1 to 2 of 2 entries

**Queue a new Request:**

Get Parameter Values GO

Connection Request Sent!

Send Connection Request

Connection Request Sent! appears

Figure 14: Manual Send Connection Request from ACS

Step 3 - Check new firmware version  
 It may take up to 10 minutes to complete the device firmware upgrade task remotely, depending on the 3G connection speed and the distance between the TR-069 CPEs and the TR-069 Server.  
 When the upgrade is complete, navigate to the Device Data tab to confirm the firmware version has changed.

Home » Devices » Manage Device :: 9F1403 [ 006064-NWL11 Series ]

Information | **Device Data** | Device Log | Device Flagging | Communication Log

Parameters cached for this Device.  
To expand / collapse a section click on the title or click on the +/- sign to the left of the title.

**Expand / Collapse All**

| InternetGatewayDevice |   |
|-----------------------|---|
| - DeviceInfo          |   |
| HardwareVersion       | D<br>2013-06-25 03:08   |
| ProvisioningCode      | <br>2013-06-25 03:08  |
| SoftwareVersion       | 1.10.28.43604<br>2013-06-25 03:08                             |
| SpecVersion           | 1.0<br>2013-06-25 03:08                                       |
| DeviceSummary         | InternetGatewayDevice:1.1[[]](Baseline:1)<br>2013-06-25 03:08 |

**Confirm the firmware version has changed** →

Figure 15: Confirming the firmware version has changed

Remote CPE firmware upgrade via TR-069 is complete.

## Triggering a connection request via SMS

If the M2M CDMA does not have a publicly routable IP address, a connection request may be triggered by sending an SMS to the router.

The SMS command to trigger a connection request is:

```
set tr069.request.trigger=1
```