## **Cable Modem States**

John J. Downey – Cisco Systems CMTS Technical Leader 5/27/14

http://cisco.com/en/US/partner/products/hw/cable/ps2217/products\_command\_reference\_chapter09186a008018981c.html

https://techzone.cisco.com/t5/RF-Gateway-CMTS/full-CM-state-list/ta-p/550243

Table 3-15 shows the possible values for the MAC state field:

Table 3-15 Descriptions for the MAC State Field $\frac{1}{2}$		
MAC State Value	Description	
Registration and Provisioning Status Conditions		
init(r1)	The CM sent initial ranging. (Contention time)	
init(r2)	The CM is ranging. The CMTS received initial ranging from the CM and has sent RF power, timing offset, and frequency adjustments to the CM. (Scheduled time)	
init(rc)	Ranging has completed. <b>Note</b> If a CM appears to be stuck in this state, it could be that the CM is able to communicate successfully on the cable network, but that the upstream is at capacity and does not have any additional bandwidth to allow the CM to finish registration and come online. Either manually move one or more CMs to other upstreams, or enable load balancing on the upstream using the <b>cable load- balance group</b> commands.	
init(d)	The DHCP request was received. This also indicates that the first IP <b>broadcast</b> packet has been received from the CM.	
init(i)	The cable modem has received the DHCPOFFER reply from the DHCP server that has assigned an IP address to the modem, but the modem has not yet replied with a DHCPREQUEST message requesting that particular IP address, nor has it sent an IP packet with that IP address. <b>Note</b> If a CM appears to be stuck in this state, the CM has likely received the DHCPOFFER reply from the DHCP server, but this	
	particular CM.	
init(o)	The CM has begun to download the option file (DOCSIS configuration file) using the Trivial File Transfer Protocol	

	(TFTP), as specified in the DHCP response. If the CM remains in this state, it indicates that the download has failed.	
init(t)	Time-of-day (TOD) exchange has started.	
resetting	The CM is being reset and will shortly restart the registration process.	
Non-error Status Conditions		
cc(r1)	The CM had registered and was online, but has received a Downstream Channel Change (DCC) or Upstream Channel Change (UCC) request message from the CMTS. The CM has begun moving to the new channel, and the CMTS has received the CM's initial ranging on the new downstream or upstream channel. At the MAC layer, the CM is considered offline because it is not yet passing traffic on the new channel, but this state does not trigger the flap-list counters.	
cc(r2)	This state should normally follow $cc(r1)$ and indicates that the CM has finished its initial ranging on the new channel, and is currently performing continuous ranging on the new channel. At the MAC layer, the CM is considered offline because it is not yet passing traffic on the new channel, but this state does not trigger the flap-list counters.	
offline	The CM is considered offline (disconnected or powered down).	
online	The CM has registered and is enabled to pass data on the network.	
online(d)	The CM registered, but network access for CPE devices using this CM has been disabled through the DOCSIS configuration file. The CM does not forward traffic to or from the CPE devices, but the CMTS can continue to communicate with the CM using DOCSIS messages and IP traffic (such as SNMP commands).	
	<b>Note</b> If BPI was enabled in the DOCSIS configuration file sent to the CM, assume that the CM is using BPI encryption, unless other messages show that the BPI negotiation and key assignments have failed.	
online(pkd)	The CM registered, but network access for CPE devices using this CM has been disabled through the DOCSIS configuration file. In addition, BPI is enabled and KEK is assigned.	
	<b>Note</b> This state is equivalent to the online(d) and online(pk) states.	
online(ptd)	The CM registered, but network access for CPE devices using this CM has been disabled through the DOCSIS configuration file. In addition, BPI is enabled and TEK is assigned. BPI encryption is	

	now being performed.	
	<b>Note</b> This state is equivalent to the online(d) and online(pt) states.	
online(pk)	The CM registered, BPI is enabled and KEK is assigned.	
online(pt)	The CM registered, BPI is enabled and TEK is assigned. BPI encryption is now being performed.	
	<b>Note</b> If network access was disabled in the DOCSIS configuration file sent to the CM, the network disabled status takes precedence, and the MAC status field shows online(d) instead of online(pt) even when BPI encryption is enabled and operational.	
<b>Note</b> If an exclamation point (!) appears in front of one of the online states, it indicates that the <u>cable dynamic-secret</u> command has been used with either the <b>mark</b> or <b>reject</b> option, and that the cable modem has failed the dynamic secret authentication check.		
expire(pk)	The CM registered, BPI is enabled, KEK was assigned, but the current KEK expired before the CM could successfully renew a new KEK value.	
expire(pkd)	The CM registered, but network access for CPE devices using this CM has been disabled through the DOCSIS configuration file. In addition, BPI is enabled, KEK was assigned, but the current KEK expired before the CM could successfully renew a new KEK value.	
	<b>Note</b> This state is equivalent to the online(d) and expire(pk) states.	
expire(pt)	The CM registered, BPI is enabled, TEK was assigned, but the current TEK expired before the CM could successfully renew a new KEK value.	
expire(ptd)	The CM registered, but network access for CPE devices using this CM has been disabled through the DOCSIS configuration file. In addition, BPI is enabled, TEK was assigned, but the current TEK expired before the CM could successfully renew a new KEK value.	
	<b>Note</b> This state is equivalent to the online(d) and expire(pt) states.	
Error Status Conditions		
reject(m)	The CM attempted to register but registration was refused due to a bad Message Integrity Check (MIC) value. This also could	

	indicate that the shared secret in the DOCSIS configuration file does not match the value configured on the CMTS with the <u>cable</u> <u>shared-secret</u> command.
	In Cisco IOS Release 12.1(11b)EC1 and Cisco IOS Release 12.2(8)BC2 or later releases, this could also indicate that the <u>cable</u> <u>tftp-enforce</u> command has been used to require that a CM attempt a TFTP download of the DOCSIS configuration file before registering, but the CM did not do so.
reject(c)	The CM attempted to register, but registration was refused due to a a number of possible errors:
	• The CM attempted to register with a minimum guaranteed upstream bandwidth that would exceed the limits imposed by the <u>cable upstream admission-control</u> command.
	• The CM has been disabled because of a security violation.
	• A bad class of service (COS) value in the DOCSIS configuration file.
	• The CM attempted to create a new COS configuration but the CMTS is configured to not permit such changes.
	• The CM failed the timestamp check for its DOCSIS configuration file. (This could indicate a possible theft-of-service attempt, or a problem with the synchronization of the clocks on the CM and CMTS.)
reject(pk)	KEK key assignment is rejected, BPI encryption has not been established.
reject(pkd)	The CM registered, but network access for CPE devices using this CM has been disabled through the DOCSIS configuration file. In addition, BPI encryption was not established because KEK key assignment was rejected.
	<b>Note</b> This state is equivalent to the online(d) and reject(pk) states.
reject(pt)	TEK key assignment is rejected, BPI encryption has not been established.
reject(ptd)	The CM registered, but network access for CPE devices using this CM has been disabled through the DOCSIS configuration file. In addition, BPI encryption was not established because TEK key assignment was rejected.

	<b>Note</b> This state is equivalent to the online(d) and reject(pt) states.	
<b>Note</b> In Cisco IOS Release 12.1(20)EC, Cisco IOS Release 12.2(15)BC1, and earlier releases, when network access is disabled in the DOCSIS configuration file sent to the CM, the network disabled status takes precedence, and the MAC status field shows online(d) even if BPI encryption fails. Use the <b>show cable modem</b> <i>mac-address</i> command to confirm whether BPI is enabled or disabled for a particular cable modem.		
reject(ts)	The CM attempted to register, but registration failed because the TFTP server timestamp in the CM registration request did not match the timestamp maintained by the CMTS. This might indicate that the CM attempted to register by replaying an old DOCSIS configuration file used during a prior registration attempt.	
reject(ip)	The CM attempted to register, but registration failed because the IP address in the CM request did not match the IP address that the TFTP server recorded when it sent the DOCSIS configuration file to the CM. IP spoofing could be occurring.	
reject(na)	The CM attempted to register, but registration failed because the CM did not send a Registration-Acknowledgement (REG-ACK) message in reply to the Registration-Response (REG-RSP) message sent by the CMTS. A Registration- NonAcknowledgement (REG-NACK) is assumed.	

These are per-DHCP state decode, for example, (io) is DHCP\_OFFER and (dr) is dhcp request - see below. Added with 12.3.13a.

Resetting - CM\_RESET

init(d) - Cable Modem has broadcast a DHCP DISCOVER packet.

init(io) - The DHCP server has sent back a DHCP OFFER and the CMTS has relayed it to the modem.

init(dr) - CM has broadcast a DHCP REQUEST packet back to the DHCP server. init(i) - The DHCP server has replied with a DHCP ACK message to grant the modem the DHCP lease.

init(o) means that the modem is trying to download the DOCSIS configuration file from the TFTP server. Normally the "debug cable dhcp" debugs that you've collected would show the "filename" and "siaddr" which indicate what file and location the modem is trying to download from, but the debugs you've pasted in here are corrupted and don't show that. I'd suggest the following troubleshooting steps.

• Make sure that the "default-router" listed in the DHCP offer is the \*true\* IP address of the CMTS and is in the same subnet as the modem's IP address.

• Confirm that the specified file is actually available on the TFTP server.

• Make sure that a traceroute from the TFTP server to the Modem's IP address goes via the CMTS • If "cable dynamic-secret" is enabled, try temporarily disabling it. In older IOS or with some weird TFTP servers this can sometimes cause problems.

• Does the problem affect \*all\* modems? If not then isolate the differences between working modems and failing modems (e.g. common OUI? different options in DHCP offer? IP address range different?)

The "\*" symbol next to online state is added by DDTS "<u>CSCtj59842</u>" to display the modems that fail bpi-plus-policy. The DDTS Description says: "When modems fail the bpi-plus-policy, the modems come online(pt) but are blocked from sending 13 traffic using a per-device ACL. There is currently no easy way to see which modems are affected so a new symbol will be added to show the modems that failed the bpi-plus-policy."

About reject(ts): http://topic.cisco.com/news/cisco/cs-ubr/msg20412.html

The CM attempted to register, but registration failed because the TFTP server timestamp in the CM registration request did not match the timestamp maintained by the CMTS. This might indicate that the CM attempted to register by replaying an old DOCSIS configuration file used during a prior registration attempt.

Assign(ept) means BPI is enabled and TEK is assigned. The registration messages will be encrypted. EAE is also enabled.

```
modem failed bpi-plus-policy
# - modem did not use TFTP downloaded CM config file
* ! - modem failed DMIC calculation multiple times
* & - modem uses self-signed certificate to authenticate itself
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