Planning Guide: Verizon Internet Access, Static IP, for Cisco LTE eHWIC/GRWIC/819

Overview
Verizon Wireless offers four 3G/4G data services for enterprises to connect remote sites through Verizon Wireless Long Term Evolution (LTE):

- **Machine-to-Machine (M2M) price plan with Internet access and dynamic IP:** This service enables a router to connect users or devices to the Internet or an enterprise network (through a customer premises equipment (CPE)-based VPN such as IP Security [IPsec], generic routing encapsulation [GRE], Dynamic Multipoint VPN [DMVPN], etc.).
- **M2M price plan with Internet access with static IP:** This service offers the same services as the previous one, except the 3G or 4G interface of each router receives a consistent predetermined 3G or 4G IP address.
- **Mobile Private Network (MPN):** This service enables a router to connect to an enterprise network. It requires a customer premises-based VPN or Network Address Translation (NAT) for users behind the remote router to access the network.
- **Mobile Private Network (MPN) with Dynamic Mobile Network Routing (DMNR):** This service enables a router to connect users to an enterprise private network without the need for customer premises-based VPN. Traffic does not traverse the Internet. Dynamic routing allows changing of local and remote IP addresses without coordination with Verizon. It can be used with any Cisco VPN option, including Group Encrypted Transport VPN.

This planning guide outlines the process to plan for Internet LTE service with static IP addressing. Relevant documents are also referenced. Do not power up the integrated services router (ISR) until you have read these instructions.

1. No special service is needed outside of an approved pricing plan for Internet access. However, the LTE enhanced high-speed WAN interface card (eHWIC) must be used with a Cisco Integrated Services Routers Generation 2 (ISR G2) router (Cisco 1900, 2900, or 3900 Series Integrated Services Router) whether provided by the Verizon demonstration loan program or by your organization. For the CGR-2010 the LTE GRWIC is required. For the C819G-4G-V, the LTE interface is integrated.

2. Ensure you have a subscriber identity module (SIM/USIM/Mini-SIM, Verizon SKU “DIRECTSIM4G-D”) for the LTE eHWIC/GRWIC/819 with an approved pricing plan. Your Verizon account manager is the appropriate contact for obtaining a SIM.
   a. The SIM must be provisioned and associated with international mobility equipment identity (IMEI) of the LTE eHWIC/GRWIC/819 modem before activation on an approved plan.
      i. If this ISR is a demonstration unit provided by Verizon Wireless, an appropriately provisioned SIM should be included as part of the package sent to you.
   b. No username or password needs to be set or defined. The LTE network should set the APN without configuration. If this does not occur, you must know the APN for this service. Your Verizon Wireless representative can provide this information (ne01.vzwstatic, so01.vzwstatic, we01.vzwstatic, etc.).
3. Check the LTE eHWIC (in the separate box) to see if the SIM is inserted. If not, insert the SIM using the instructions found at http://www.cisco.com/en/US/docs/routers/access/interfaces/ic/hardware/installation/guide/EHWIC-4GLTEHW.html#wp1147248. The GRWIC on CGR is similar. The 819 has a small SIM panel underneath.

4. Install the eHWIC into the ISR G2 (or GRWIC into the CGR-2010).
   a. The instructions to physically install the LTE eHWIC into the ISR are at http://www.cisco.com/en/US/docs/routers/access/interfaces/ic/hardware/installation/guide/inst_ic.html#wp1037332. The CGR-2010 is similar. The C819G-4G-V has the LTE already integrated.
   b. Install the LTE eHWIC into the right-most eHWIC slot (looking at the rear of the ISR, slot 0/0) (Figure 1).

![LE eHWIC](image)

Figure 1. LE eHWIC

5. Install the antenna cables to the LTE eHWIC/GRWIC/819 and the antennas onto the extension cables.
   a. Instructions can be found in the section “Additional Information”.

6. Power up the ISR and ensure that the antennas are positioned appropriately.
   a. With terminal or console access to the ISR G2 (logging the terminal console is recommended):
      i. Power up the ISR. Hit Enter, and at the console prompt type “enable”. No ID or password should be set. If there is, follow the instructions to reset the password at: http://www.cisco.com/en/US/products/ps5855/products_password_recovery09186a0080b3911d.shtml
      ii. Position antennas for the best RSSI signal > -80 dBm with the show cell 0/0/0 radio command (show cell 0 radio for 819).
      iii. Type “show ver” and ensure that the recommended Cisco IOS® Software version is running. The minimum Cisco IOS software release depends on the LTE modem firmware level (seen via IOS command “show cell 0/x/0 hardware”). For firmware 1.0.9.3 The IOS LTE Interim image is required (to access send an email to interim_lte_image@cisco.com include your cisco.com user ID). For firmware release 3.5.10.6 (recommended), IOS 15.2(4)M3 is required. Firmware 3.5.10.6 is available at: http://software.cisco.com/download/release.html?i=!y&mdfid=284772061&softwareid=284285628&release=3.5.10.6&os=
      iv. Type “show run” to see if the configuration matches the configuration guide on the following pages.
      v. If the configuration does not match the provided configuration, add or change the appropriate lines through the command-line interface (CLI) config t, etc. Note: Even with static IP the cell interface remains “address negotiated”.
   b. It may take up to 10 minutes after ISR power-up before the LTE interface becomes active because the SIM must connect to the network and start a process to configure the LTE modem appropriately. The ISR should not be powered down for at least 10 minutes after initial power-up (with antennas attached). This process provisions the appropriate APN. If the network-based process (SIM-Over-the-Air/Over-the-Air Device Manager [SIM-OTA/OTA-DM]) does not change the APN, either the SIM is not properly activated or provisioned (Call Verizon Wireless Customer Care) or the SIM was installed in the LTE eHWIC without this network process completed and the ISR powered down. If the latter, there are two ways to address this problem: 1) Power down the ISR, remove the SIM, and put the SIM into another LTE device (Mifi device, USB LTE modem, LTE eHWIC, etc.).
When that device connects, reinsert the SIM into the LTE eHWIC, connect the antennas, power up, and wait 10 minutes. 2) With the IOS LTE interim image, use the local APN change script (URL in step 8). The Cisco IOS Software command `show cellular 0/x/0 profile` displays the APN (`show cellular 0 profile` for the 819). With 15.2(4)M3 (ISR) or 15.3(1)T1 (VGR), use the 1-line IOS enable mode command (shown in step 8).

7. **If the LTE connection becomes active but then begins to flap (repeats going down and up periodically, usually every 5 to 60 seconds), a configuration problem must be resolved.**
   - This behavior can be caused by a network disconnect due to IP source address violations. It is resolved by reconfiguring the traffic to be tunneled, NAT, or access control lists (ACLs) so that no traffic is routed without being tunneled or subjected to NAT. If you cannot determine which IP address is causing the IP source violation, contact the Verizon Wireless Enterprise Help Desk (800 922-0204) and ask them to trace the call and report the IP address that is causing the problem. Then correct or add NAT, ACL, or VPN to stop any packets without the LTE eHWIC IP address from leaking out.

8. Cisco IOS 15.2(4)M3 (for ISR G2) or 15.3(1)T1 (for CGR-2010) (both require LTE modem firmware 3.5.10.6) or the IOS LTE Interim Special Software Release (if LTE modem firmware is still at 1.0.9.3) mitigates the LTE eHWIC out-of-sync condition.
   - The ISR LTE auto-recovery script should NOT be used and should be removed after installing and running the IOS Interim image or 15.2(4)M3. The links with the ISR script & instructions for LTE auto-recovery will be maintained, as it includes the local APN change script (only required for LTE Internet/Static IP service, only if OTA-DM fails, and only if using the IOS interim image). For 15.2(4)M3 (ISR) or 15.3.(1)T1 (CGR) the 1-line IOS command is used:
     - 15.2(4)M3 IOS enable-mode command example: `cellular 0/0/0 lte profile create 1 ne01.VZWSTATIC`
     - For the IOS interim image: (requires a cisco.com user ID):

**Additional Information**

- Cisco LTE Portal: [http://www.cisco.com/go/4g](http://www.cisco.com/go/4g) (Verizon documents for configuration under “white papers”)
- LTE eHWIC antenna, cabling, and lightning arrester instructions:
Configuration Guide: Verizon Internet Access, Static IP, and LTE eHWIC

1. For ISR, the recommended Cisco IOS release is 15.2(4)M3 or later (first requires LTE eHWIC firmware 3.5.10.6). For CGR-2010 it is 15.3(1)T1 (LTE GRWIC firmware 3.5.10.6); To load LTE modem firmware 3.5.10.6, the ISR must be running 15.2(4)M2 (or the IOS LTE Interim Image special release). For CGR 15.2(4)M2 must be running to load the firmware. Then immediately upgrade IOS to the aforementioned release, depending on platform.
   a. LTE eHWIC firmware level can be checked with the Cisco IOS Software enable mode command `show cellular 0/x/0 profile` (where 0/x/0 is the cellular interface number seen in the `show ip interface brief` Cisco IOS Software enable mode command).

2. For ISR, The Cisco IOS LTE Interim Special Software Release or 15.2(4)M3 (or 15.3[1)T1 for CGR) mitigates the LTE eHWIC out-of-sync condition with its on-board LTE modem. The ISR LTE auto-recovery script should NOT be used and should be removed after installing and running these releases.

3. If an LTE connection cannot be made, the Access Point Name (APN) value on the LTE eHWIC modem should be checked (ISR/CGR command `show cellular 0/x/0 profile`, for 819 `show cellular 0 profile`). If it is not the appropriate APN (VZWINTERNET), refer to step 8 in the above planning section.

4. This guide is for the Internet NAT use case, with Verizon Internet dynamic IP address service. VPN would be configured as needed with the crypto map placed on the cellular interface (or other method as required using GRE tunnel interfaces, etc.)

5. All packets leaving the ISR through the LTE interface must be sent through Port Address Translation (PAT) or VPN. If any packets are sent over LTE with the source IP address other than the LTE interface IP address, the LTE connection will be disconnected (IP address violation). Because the ISR will immediately attempt to reconnect, a flapping condition will occur and continue.

High-Level Network Diagram

Figure 2. Customer Design Scenarios
ISR LTE eHWIC, CGR LTE GRWIC Internet Configuration for Primary Access

```plaintext
!### command allowing for "LTE test cellular" enable mode commands ###
service internal
!
hostname c1921-Internet
!
!### load appropriate IOS image ###
boot system flash:c1900-universalk9-mz.SSA.V152_4_M_LTE_LINK_REC
!
ip cef
!
!### CHAT Script to make a data call ###
chat-script ltescript "" "AT!CALL1" TIMEOUT 20 "OK"
!
!### This Loopback address used to source pings for testing purposes. ###
!
interface Loopback1
description ### always-on interface ###
ip address 1.2.3.9 255.255.255.255
!
!### The maximum TCP MSS is set to 1400 bytes to allow for any GRE, IPsec and other network overhead. The route-map clears DF bits in the IP headers. ###
!
interface GigabitEthernet0/0
 ip address 10.20.30.1 255.255.255.0
 ip nat inside
 ip tcp adjust-mss 1400
 ip policy route-map clear-df
!
interface GigabitEthernet0/1
 ip address 10.20.40.1 255.255.255.0
 ip nat inside
 ip tcp adjust-mss 1400
 ip policy route-map clear-df
!
!### Interface Cellular - used to make a data call. Receives Pool/WAN IP (dynamic or static) from P-GW. The call will be activated using the Dialer Watch group. Note that the "dialer idle-timeout" is set to never (0). For static IP address services, still use "ip address negotiated". ###
!
interface Cellular0/0/0
 ip address negotiated
 ip nat outside
```

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no ip unreachables
encapsulation slip
load-interval 30
dialer in-band
dialer idle-timeout 0
dialer string ltescript
dialer watch-group 1
async mode interactive

!### This NAT statement ensures all traffic leaving the ISR is sourced with the IP address of the LTE cellular interface, to avoid auto-disconnection by the network. All traffic appears to come from the LTE IP address. ###
ip nat inside source list 100 interface Cellular0/0/0 overload

!### This ACL enables NATing of all traffic leaving the cell interface ###
access-list 100 permit ip any any

!### This static route sends all traffic destined for other than the ISR LAN and loopback subnets out the LTE connection. ###
ip route 0.0.0.0 0.0.0.0 Cellular0/0/0

!### This route-map clears the DF-bit in IP packets that come into the ISR from the Gigabit Ethernet interfaces. ###
route-map clear-df permit 10
  set ip df 0

!### This section defines the LTE call activation triggers and timers. ###

!### The call will be triggered by this statement. The address "5.6.7.8" is a "dummy" route. Any "dummy" value can be used. ###
dialer watch-list 1 ip 5.6.7.8 0.0.0.0

!### The ISR will wait for 60 sec. before activating the call after the initial boot. ###
dialer watch-list 1 delay route-check initial 60

!### The ISR will wait 1 sec. before activating the call. ###
dialer watch-list 1 delay connect 1

line 0/0/0
  script dialer ltescript
  modem InOut
  no exec
  transport input telnet

! end
C819G-4G-V, C819HG-4G-V Internet Configuration for Primary Access

```plaintext
!### command allowing for "LTE test cellular" enable mode commands ###
service internal
!
hostname c819-Internet
!
### IOS 15.2(4)M3 requires LTE modem firmware 3.5.10.6 ###
boot system flash: c800-universalk9-mz.SPA.152-4.M3.bin
!
ip cef

###If there is already a DHCP server, exclude the dhcp pool stanza below###
ip dhcp pool vlan1
  import all
  network 10.20.40.0 255.255.255.0
  default-router 10.20.40.1
  dns-server 4.2.2.2 8.8.8.8
!
no ip domain lookup
!
### CHAT Script to make a data call ###
chat-script ltescript "" "AT!CALL1" TIMEOUT 20 "OK"
!
### This stanza is currently required due to Bug ID: CSCud06180 ###
controller Cellular 0
  lte modem link-recovery enable
  lte modem link-recovery monitor-timer 60
!
### This Loopback address used to source pings for testing purposes. ###
!
interface Loopback1
  description ### always-on interface ###
  ip address 1.2.3.9 255.255.255.255
  ip nat inside
!
### The maximum TCP MSS is set to 1390 bytes to allow for GRE, IPsec and other network overhead. The route-map clears DF bits in the IP headers. ###
!
interface VLAN1
  ip address 10.20.40.1 255.255.255.0
  ip nat inside
  ip tcp adjust-mss 1390
  ip policy route-map clear-df
```

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### Interface Cellular
- used to make a data call. Receives Pool/WAN IP from EXGW. The call will be activated using the “dialer watch-group”.

“Dialer enable-timeout 60” is currently needed due to Bug ID: CSCud06180 With this setting it will take 1 minute to bring up the LTE connection. ###

```bash
interface Cellular0
  ip address negotiated
  ip nat outside
  no ip unreachables
  encapsulation slip
  load-interval 30
  dialer in-band
  dialer idle-timeout 0
  dialer enable-timeout 60
  dialer string ltescript
  dialer watch-group 1
  async mode interactive

! ### This NAT statement ensures all traffic leaving the ISR is sourced with the IP address of the LTE cellular interface, to avoid auto-disconnection by the network. All traffic appears to come from the LTE IP address. ###

ip nat inside source list 100 interface Cellular0/0/0 overload

! ### This ACL enables NATing of all traffic leaving the cell interface ###

access-list 100 permit ip any any

! ### This static route sends all traffic destined for other than the ISR LAN and loopback subnets out the LTE connection. ###

ip route 0.0.0.0 0.0.0.0 Cellular0/0/0

! ### Route-map clears DF-bit in packets to exit via the LTE interface. ###

route-map clear-df permit 10
  set ip df 0

! ### This section defines the LTE call activation triggers and timers. ###

! ### The call will be triggered by this statement. The address “5.6.7.8” is a “dummy” route. Any “dummy” value can be used. ###

dialer watch-list 1 ip 5.6.7.8 0.0.0.0

### Wait for 60 sec. before activating the call after the initial boot. ###

dialer watch-list 1 delay route-check initial 60

### The ISR will wait 1 sec. before activating the call. ###

dialer watch-list 1 delay connect 1
```

!
### For Telnet access, define users and "line VTY 0 4" stanza. ###

```plaintext
! line 3
    script dialer ltescript
    modem InOut
    no exec
    transport input telnet
!
end
```

---

**Operation and Show Commands**

**LTE Call Comes Up**

```
C1921-Internet#test cellu 0/0/0 modem-power
Modem Power cycled successfully
C1921-Internet#
.Mar 12 21:54:23.334: %CELLWAN-2-MODEM_UP: Modem in HWIC slot 0/0 is now UP
.Mar 12 21:54:51.514: %LINK-3-UPDOWN: Interface Cellular0/0/0, changed state to up
.Mar 12 21:54:52.514: %LINEPROTO-5-UPDOWN: Line protocol on Interface Cellular0/0/0, changed state to up
```

```
c1921-Internet#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
    D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
    N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
    E1 - OSPF external type 1, E2 - OSPF external type 2
    i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
    ia - IS-IS inter area, * - candidate default, U - per-user static route
    O - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
    + - replicated route, % - next hop override

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

S* 0.0.0.0/0 is directly connected, Cellular0/0/0
    1.0.0.0/32 is subnetted, 1 subnets
C  1.2.3.9 is directly connected, Loopback1
    10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
C  10.20.30.0/24 is directly connected, GigabitEthernet0/0
L  10.20.30.1/32 is directly connected, GigabitEthernet0/0
C  166.158.61.41/32 is directly connected, Cellular0/0/0
```
C1921-Internet#\textbf{sh ip int brie}

<table>
<thead>
<tr>
<th>Interface</th>
<th>IP-Address</th>
<th>OK? Method</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embedded-Service-Engine0/0</td>
<td>unassigned</td>
<td>YES NVRAM</td>
<td>administratively down down</td>
</tr>
<tr>
<td>GigabitEthernet0/0/0</td>
<td>10.20.30.1</td>
<td>YES NVRAM</td>
<td>up</td>
</tr>
<tr>
<td>GigabitEthernet0/0/1</td>
<td>10.20.40.1</td>
<td>YES NVRAM</td>
<td>down</td>
</tr>
<tr>
<td>GigabitEthernet0/0/1/0</td>
<td>unassigned</td>
<td>YES unset</td>
<td>down</td>
</tr>
<tr>
<td>GigabitEthernet0/0/1/1</td>
<td>unassigned</td>
<td>YES unset</td>
<td>down</td>
</tr>
<tr>
<td>GigabitEthernet0/0/1/2</td>
<td>unassigned</td>
<td>YES unset</td>
<td>down</td>
</tr>
<tr>
<td>GigabitEthernet0/0/1/3</td>
<td>unassigned</td>
<td>YES unset</td>
<td>down</td>
</tr>
<tr>
<td>Cellular0/0/0</td>
<td>166.158.61.41</td>
<td>YES IPCP</td>
<td>up</td>
</tr>
<tr>
<td>Cellular0/0/1</td>
<td>unassigned</td>
<td>YES unset</td>
<td>down</td>
</tr>
<tr>
<td>Cellular0/0/2</td>
<td>unassigned</td>
<td>YES unset</td>
<td>down</td>
</tr>
<tr>
<td>Cellular0/0/3</td>
<td>unassigned</td>
<td>YES unset</td>
<td>down</td>
</tr>
<tr>
<td>Loopback1</td>
<td>1.2.3.9</td>
<td>YES NVRAM</td>
<td>up</td>
</tr>
<tr>
<td>NV10</td>
<td>10.20.30.1</td>
<td>YES unset</td>
<td>up</td>
</tr>
<tr>
<td>Vlan1</td>
<td>unassigned</td>
<td>YES unset</td>
<td>down</td>
</tr>
</tbody>
</table>

C1921-Internet#\textbf{sh dialer}

Ce0/0/0 - dialer type = IN-BAND ASYNC NO-PARITY
Idle timer (never), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (10 secs)
Dialer state is data link layer up

\textbf{Dial reason: Dialing on watched route loss}
Time until disconnect never
Current call connected 00:01:24
Connected to newchat

<table>
<thead>
<tr>
<th>Dial String</th>
<th>Successes</th>
<th>Failures</th>
<th>Last DNIS</th>
<th>Last status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ltechat</td>
<td>1</td>
<td>1</td>
<td>00:01:24</td>
<td>successful</td>
</tr>
</tbody>
</table>

C1921-Internet#\textbf{ping 4.2.2.2 source lo1}
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 4.2.2.2, timeout is 2 seconds:
Packet sent with a source address of 1.2.3.9
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 60/69/76 ms

C1921-Internet#\textbf{ping 4.2.2.2 source gi0/0}
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 4.2.2.2, timeout is 2 seconds:
Packet sent with a source address of 10.20.30.1
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 56/60/64 ms

C1921-Internet#sh ip nat trans
Promiscuous Inside global  Inside local       Outside local       Outside global
icmp 166.158.61.41:9309 1.2.3.9:9309      4.2.2.2:9309       4.2.2.2:9309
icmp 166.158.61.41:9310 1.2.3.9:9310      4.2.2.2:9310       4.2.2.2:9310
icmp 166.158.61.41:9311 10.20.30.1:9311    4.2.2.2:9311       4.2.2.2:9311
udp 166.158.61.41:123  10.20.30.3:123      173.244.211.10:123 173.244.211.10:123
C1921-Internet#

C1921-Internet#sh cell 0/0/0 all

Hardware Information
=====================
Modem Firmware Version = SWI9600M_01.00.09.03
Modem Firmware built = 2011/07/01 19:31:09
Hardware Version = 20460000
International Mobile Subscriber Identity (IMSI) = 311480003046872
International Mobile Equipment Identity (IMEI) = 990000820020925
Electronic Serial Number (ESN) = 0x8002A36C [12800172908]
Integrated Circuit Card ID (ICCID) = 89148000000030771738
Mobile Subscriber International Subscriber IDentity Number (MSISDN) = +12675657329

Profile Information
=====================
Profile 1 = ACTIVE*
--------
PDP Type = IPv4
PDP address = 166.158.61.41
Access Point Name (APN) = ne01.VZWSTATIC
Authentication = None
Username: 
Password: 
    Primary DNS address = 198.224.188.236
    Secondary DNS address = 198.224.189.236

* - Default profile

Data Connection Information
=============================
Data Transmitted = 0 bytes, Received = 0 bytes
Profile 1, Packet Session Status = ACTIVE
IP address = **166.158.61.41**

<table>
<thead>
<tr>
<th>Profile</th>
<th>Packet Session Status</th>
<th>Inactivity Reason</th>
</tr>
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<tbody>
<tr>
<td>2</td>
<td>INACTIVE</td>
<td>Unknown</td>
</tr>
<tr>
<td>3</td>
<td>INACTIVE</td>
<td>Unknown</td>
</tr>
<tr>
<td>4</td>
<td>INACTIVE</td>
<td>Unknown</td>
</tr>
<tr>
<td>5</td>
<td>INACTIVE</td>
<td>Unknown</td>
</tr>
<tr>
<td>6</td>
<td>INACTIVE</td>
<td>Unknown</td>
</tr>
<tr>
<td>7</td>
<td>INACTIVE</td>
<td>Unknown</td>
</tr>
<tr>
<td>8</td>
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</tr>
<tr>
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<td>Unknown</td>
</tr>
<tr>
<td>16</td>
<td>INACTIVE</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

**Network Information**

- **Current Service Status**: No service, **Service Error**: None
- **Current Service**: Packet switched
- **Current Roaming Status**: Home
- **Network Selection Mode**: Automatic
- **Mobile Country Code (MCC)**: 27296
- **Mobile Network Code (MNC)**: 0
Radio Information
=================
Radio power mode = ON
Current RSSI = -60 dBm
LTE Technology Preference = AUTO
LTE Technology Selected = LTE

Modem Security Information
==========================
Card Holder Verification (CHV1) = Disabled
SIM Status = OK
SIM User Operation Required = None
Number of CHV1 Retries remaining = 3
C1921-Internet#
C1921-Internet#sh ver
Cisco IOS Software, C1900 Software (C1900-UNIVERSALK9-M), Version 15.1(4)M4,
MAINTENANCE INTERIM SOFTWARE
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2012 by Cisco Systems, Inc.
Compiled Sun 04-Mar-12 01:07 by prod_rel_team

ROM: System Bootstrap, Version 15.0(1r)M12, RELEASE SOFTWARE (fc1)

C1921-Internet uptime is 6 days, 5 hours, 4 minutes
System returned to ROM by power-on
System restarted at 17:56:21 UTC Tue Mar 6 2012
System image file is "flash:c1900-universalk9-mz.SPA.151-4.M4"
Last reload type: Normal Reload

This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:

If you require further assistance please contact us by sending email to
export@cisco.com.
Cisco CISCO1921/K9 (revision 1.0) with 487424K/36864K bytes of memory.
Processor board ID FTX155180ES
6 Gigabit Ethernet interfaces
2 terminal lines
1 Virtual Private Network (VPN) Module
4 Cellular interfaces
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
250864K bytes of USB Flash usbflash0 (Read/Write)

License Info:
License UDI:

<table>
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<th>SN</th>
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<tr>
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<td>FTX155180ES</td>
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Technology Package License Information for Module:'c1900'

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<th>Next reboot</th>
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<td>Permanent</td>
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Configuration register is 0x2102