

# Planning Guide: Verizon Internet Access, Static IP, for Cisco LTE eHWIC/NIM/GRWIC/8x9

## 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.**

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 a Verizon/Cisco demonstration loan program or by your organization. For the CGR-2010 the LTE GRWIC is required. For the ISR 4K the LTE NIM is required. For the 819, 829, 899, 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 or NIM (may be in a separate box) to see if the SIM is inserted. If not, insert the SIM using the instructions found at
   
[www.cisco.com/en/US/docs/routers/access/interfaces/ic/hardware/installation/guide/EHWIC-4G-LTEHW.html#wp1147248](http://www.cisco.com/en/US/docs/routers/access/interfaces/ic/hardware/installation/guide/EHWIC-4G-LTEHW.html#wp1147248)
  
[www.cisco.com/c/en/us/td/docs/routers/access/interfaces/NIM/hardware/installation/guide/4GLTENIM\\_HIG.html#pgfid-1201912](http://www.cisco.com/c/en/us/td/docs/routers/access/interfaces/NIM/hardware/installation/guide/4GLTENIM_HIG.html#pgfid-1201912).
   
The GRWIC on CGR is similar. The 819 has a small SIM panel underneath.
4. Install the eHWIC/NIM into the ISR (or GRWIC into the CGR-2010).
  - a. The instructions to physically install the LTE eHWIC or NIM into the ISR are at
   
[www.cisco.com/en/US/docs/routers/access/interfaces/ic/hardware/installation/guide/inst\\_ic.html#wp1037332](http://www.cisco.com/en/US/docs/routers/access/interfaces/ic/hardware/installation/guide/inst_ic.html#wp1037332)
  
[www.cisco.com/c/en/us/td/docs/routers/access/interfaces/NIM/hardware/installation/guide/4GLTENIM\\_HIG.html#pgfid-1209630](http://www.cisco.com/c/en/us/td/docs/routers/access/interfaces/NIM/hardware/installation/guide/4GLTENIM_HIG.html#pgfid-1209630).
   
The CGR-2010 is similar. The 8x9 ISRs have the LTE already integrated.
  - b. Install the LTE eHWIC/NIM into the right-most eHWIC slot (looking at the rear of the ISR, slot 0/0).

**Figure 1.** LE eHWIC



- 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 (logging the terminal console is recommended):
    - di. 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:
   
[www.cisco.com/en/US/products/ps5855/products\\_password\\_recovery09186a0080b3911d.shtml](http://www.cisco.com/en/US/products/ps5855/products_password_recovery09186a0080b3911d.shtml)
    - ii. Position antennas for the best RSSI signal > -80 dBm and RSRP signal > - 105 dBm, with the **show cell 0/0/0 radio** command (**show cell 0 radio** for 819).
    - iii. Type “sh cell 0/x/0 hardware (cell 0 for 819) and “show version”, and ensure that the recommended Cisco IOS® Software version is running. The generally recommended Cisco IOS software release depends on the LTE modem firmware level (seen via “show cell 0/x/0|0 hardware” command).

ISR LTE SKU	LTE Modem	Recommended firmware	Recommended IOS Release
EHWIC-4G-LTE-VZ	MC7350	5.5.58.01	15.6.3.M2
C819G-4G-VZ-K9	MC7350	5.5.58.01	15.6.3.M2
C899G-LTE-VZ-K9	MC7350	5.5.58.01	15.6.3.M2
C819G-LTE-MNA-K9	MC7354	5.5.58.01	15.6.3.M2
C819GW-LTE-MNA-K9	MC7354	5.5.58.01	15.6.3.M2

NIM-LTEA-EA ISR4	EMM7455	02.20.03.22	16.3.3
NIM-4G-LTE-VZ ISR4K	MC7350	5.5.58.01	16.3.3
NIM-LTEA-EA on ENCS	EMM7455	02.20.03.22	NFVIS 3.6.1 IOS 16.3.3
IR809G-LTE-VZ-K9	MC7350	5.5.58.01	15.6.3.M2
IR829GW-LTE-VZ-AK9	MC7350	5.5.58.01	15.6.3.M2
IR829-2LTE-EA-BK9	MC7455	02.20.03.22	15.6(3)M2
C1111-8PLTEEA C1111-4PLTEEA	EMM7455	02.20.03.22	16.6.2

- 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 “IP address negotiated”.
- b. If a new SIM is installed, 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 that may reconfigure the LTE modem. The ISR should not be powered down for at least 10 minutes after initial power-up (with antennas attached). This process provisions the appropriate data APN. If the network-based process (SIM-Over-the-Air/Over-the-Air Device Management [SIM-OTA/OTA-DM]) does not change the APN as expected, 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 the 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) Use the 1-line IOS enable mode command (shown in step 8). The Cisco IOS Software command **show cellular 0/x/0 profile** displays the APN (**show cellular 0 profile** for the 819).
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.**
    - a. 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. The data APN for Verizon Internet with Static IP LTE service is different than for Internet/Dynamic. The APN depends on the U.S. region, and should be provided by your Verizon representative. If the value is incorrect (IOS command **show cellular 0/x/0 profile** displays the APN, **show cellular 0 profile** for the 819), OTA-DM has not changed it automatically. Change the value via the following 1-line IOS enable-mode command: **cellular 0/0/0 lte profile create 3 ne01.VZWSTATIC** (Note that the Data APN is profile 3)

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## Additional Information

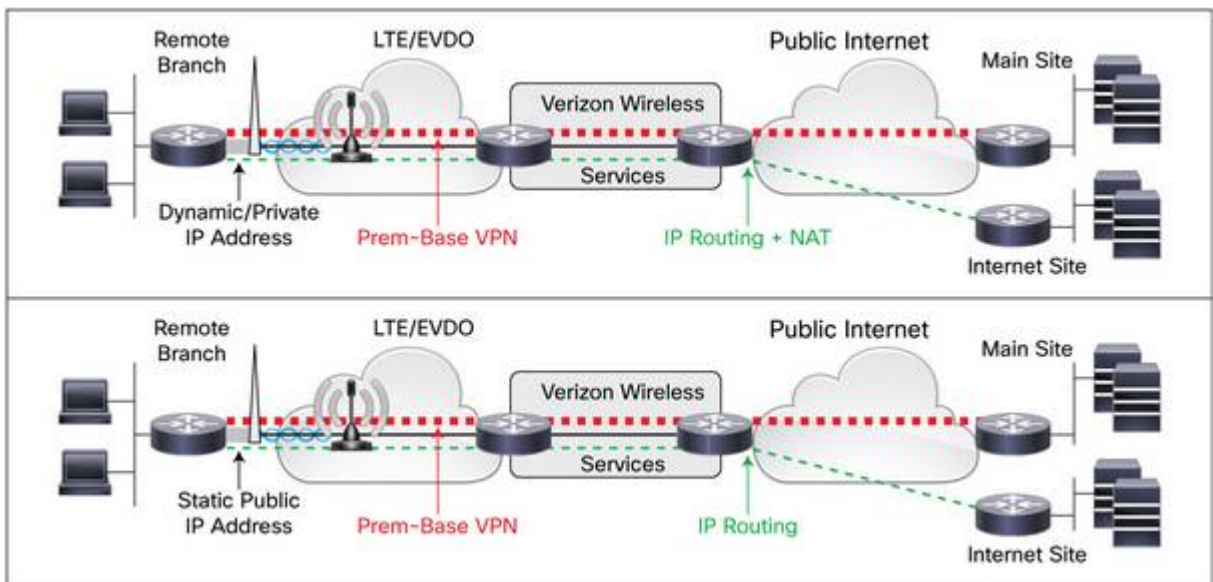
- Cisco LTE Portal: [www.cisco.com/go/4g](http://www.cisco.com/go/4g)
- Verizon planning/configuration documents:  
[www.cisco.com/en/US/products/ps5949/products\\_installation\\_and\\_configuration\\_guides\\_list.html](http://www.cisco.com/en/US/products/ps5949/products_installation_and_configuration_guides_list.html)
- LTE eHWIC hardware overview, SIM install, antenna connection, and module install:  
[www.cisco.com/en/US/docs/routers/access/interfaces/ic/hardware/installation/guide/EHWIC-4G-LTEHW.html](http://www.cisco.com/en/US/docs/routers/access/interfaces/ic/hardware/installation/guide/EHWIC-4G-LTEHW.html)
- LTE NIM hardware overview, SIM install, antenna connection, and module install:  
[www.cisco.com/c/en/us/td/docs/routers/access/interfaces/NIM/hardware/installation/guide/4GLTENIM\\_HIG.html](http://www.cisco.com/c/en/us/td/docs/routers/access/interfaces/NIM/hardware/installation/guide/4GLTENIM_HIG.html)
- LTE eHWIC Cisco IOS Software configuration (use the Verizon planning/configuration documents):  
[www.cisco.com/en/US/docs/routers/access/interfaces/software/feature/guide/EHWIC-4G-LTESW.html](http://www.cisco.com/en/US/docs/routers/access/interfaces/software/feature/guide/EHWIC-4G-LTESW.html)
- LTE NIM Cisco IOS Software configuration (use the Verizon planning/configuration documents):  
[www.cisco.com/c/en/us/td/docs/routers/access/interfaces/NIM/software/configuration/guide/4GLTENIM\\_SW.html](http://www.cisco.com/c/en/us/td/docs/routers/access/interfaces/NIM/software/configuration/guide/4GLTENIM_SW.html)
- LTE eHWIC antenna, cabling, and lightning arrestor instructions:
  - [www.cisco.com/en/US/docs/routers/access/wireless/hardware/notes/4G3G\\_ant.html](http://www.cisco.com/en/US/docs/routers/access/wireless/hardware/notes/4G3G_ant.html)
  - [www.cisco.com/en/US/docs/routers/access/wireless/hardware/notes/4Gantex15-10r.html](http://www.cisco.com/en/US/docs/routers/access/wireless/hardware/notes/4Gantex15-10r.html)
  - [www.cisco.com/en/US/docs/routers/access/wireless/hardware/notes/4Glar.html](http://www.cisco.com/en/US/docs/routers/access/wireless/hardware/notes/4Glar.html)

## Configuration Guide: Verizon Internet Access, Static IP, and LTE eHWIC

1. 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 (xx01.VZWSTATIC, where xx is ne, so, we or mw), refer to step 8 in above planning section.
2. This guide is for the Internet NAT use case, with Verizon Internet Static IP address service. VPN would be configured as needed. Please see the Internet/VPN LTE guide under white papers at [www.cisco.com/go/4g](http://www.cisco.com/go/4g).
3. 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

```
!### command allowing for "LTE test cellular" enable mode commands ###
service internal
!
hostname c1921-Internet
!
!### load appropriate IOS image ###
boot system flash:c1900-universalk9-mz.SPA.156-3.M2.bin
!
ip cef
!
!###If there is already a DHCP server, exclude the dhcp pool stanza below###
ip dhcp pool vlan1
  import all
  network 10.20.30.0 255.255.255.0
  default-router 10.20.30.1
  dns-server 4.2.2.2 8.8.8.8
!
!### CHAT Script to make a data call ###
chat-script LTE "" "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 1390 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 1390
  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 1390
  ip policy route-map clear-df
!
!### Interface Cellular - used to make a data call. The call will be
activated using the Dialer Watch group. For static IP address services,
still use "ip address negotiated". ###
!
interface Cellular0/0/0
  ip address negotiated
  ip nat outside
```

```

no ip unreachable
encapsulation slip
load-interval 30
dialer in-band
dialer idle-timeout 0
dialer enable-timeout 1
dialer string LTE
dialer watch-group 1
async mode interactive
pulse-time 0
!
!### 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 traffic leaving the cell interface. "Permit
ip any any" is no longer supported. This example will NAT any packet with
the 1st octet having an even number (including 10.x.x.x 172.x.x.x and
192.x.x.x, a superset of RFC1918 addresses). ###
access-list 100 permit ip 0.0.0.0 254.255.255.255 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 LTE
  modem InOut
  no exec
  transport input telnet
!
!
end

```

## 819/829/899 ISR Internet Configuration for Primary Access

```
!### command allowing for "LTE test cellular" enable mode commands ###
service internal
!
hostname c819-Internet
!
!### load appropriate IOS image ###
boot system flash:c800-universalk9-mz.SPA.156-3.M2.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 LTE "" "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
  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
!
!### Interface Cellular - used to make a data call. The call will be
activated using the Dialer Watch group. For static IP address services,
still use "ip address negotiated". ###
!
interface Cellular0
  ip address negotiated
  ip nat outside
  no ip unreachable
  encapsulation slip
  load-interval 30
  dialer in-band
  dialer idle-timeout 0
```



```

dialer enable-timeout 1
dialer string LTE
dialer watch-group 1
async mode interactive
pulse-time 0
!
!### 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 overload
!
!### This ACL enables NATing of traffic leaving the cell interface. "Permit
ip any any" is no longer supported. This example will NAT any packet with
the 1st octet having an even number (including 10.x.x.x 172.x.x.x and
192.x.x.x, a superset of RFC1918 addresses). ###
access-list 100 permit ip 0.0.0.0 254.255.255.255 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
!
!### 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. ###
!
line 3
  script dialer LTE
  modem InOut
  no exec
  transport input telnet
!
end

```

## ISR LTE NIM and ISR 1K Internet Configuration for Primary Access

```
!### Chat script and cellular line definitions not needed w/ISR4K 1K ###
!### command allowing for "LTE test cellular" enable mode commands ###
service internal
hostname 4331LTE
!
!### Load appropriate IOS Image ###
boot-start-marker
boot system bootflash:isr4300-universalk9.16.03.03.SPA.bin boot-end-marker
!
ip dhcp pool gi000
  import all
  network 172.20.14.0 255.255.255.0
  default-router 172.20.14.1
  dns-server 4.2.2.2 8.8.8.8
!
controller Cellular 0/0/0
!
!### 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 GigabitEthernet0/0/0
  ip address 172.20.14.1 255.255.255.0
  ip nat inside
  ip tcp adjust-mss 1390
  ip policy route-map clear-df
!
!### Interface Cellular - used to make a data call. The call will be
activated using the Dialer Watch group. For static IP address services,
still use "ip address negotiated". ###
!
interface Cellular0/0/0
  ip address negotiated
  ip nat outside
  dialer in-band
  dialer idle-timeout 0
  dialer enable-timeout 1
  dialer watch-group 1
  pulse-time 0
!
!### 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 traffic leaving the cell interface. "Permit
ip any any" is no longer supported. This example will NAT any packet with
```

---

```
the 1st octet having an even number (including 10.x.x.x 172.x.x.x and
192.x.x.x, a superset of RFC1918 addresses). ###
access-list 100 permit ip 0.0.0.0 254.255.255.255 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. ###
!
```

## Operation and Show Commands

4331LTE#

\*Aug 22 03:50:01.235: %LINK-3-UPDOWN: Interface Cellular0/2/0, changed state to up

\*Aug 22 03:50:02.235: %LINEPROTO-5-UPDOWN: Line protocol on Interface Cellular0/2/0, changed state to up

4331LTE#[term len 0](#)

4331LTE#

4331LTE#[sh 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, I - LISP

a - application route

+ - replicated route, % - next hop override, p - overrides from PfR

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

S\* 0.0.0.0/0 is directly connected, Cellular0/2/0

166.148.0.0/32 is subnetted, 1 subnets

C 166.148.x.y is directly connected, Cellular0/2/0

172.20.0.0/16 is variably subnetted, 2 subnets, 2 masks

C 172.20.14.0/24 is directly connected, GigabitEthernet0/0/0

L 172.20.14.1/32 is directly connected, GigabitEthernet0/0/0

4331LTE#

4331LTE#[sh ip int brief](#)

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0/0	172.20.14.1	YES	NVRAM	up	up
GigabitEthernet0/0/1	unassigned	YES	NVRAM	administratively down	down
GigabitEthernet0/0/2	unassigned	YES	NVRAM	administratively down	down
Cellular0/2/0	166.148.x.y	YES	IPCP	up	up
GigabitEthernet0	unassigned	YES	NVRAM	administratively down	down
Vlan1	unassigned	YES	NVRAM	administratively down	down

4331LTE#

4331LTE#[ping 4.2.2.2 source gi0/0/0](#)

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 172.20.14.1

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 38/83/247 ms

4331LTE#

4331LTE#

4331LTE#sh ip nat trans

Pro	Inside global	Inside local	Outside local	Outside global
udp	166.148.x.y:4507	172.20.14.2:61120	4.2.2.2:53	4.2.2.2:53
tcp	166.148.x.y:4098	172.20.14.2:54283	66.163.x.y:443	66.163.x.y:443
udp	166.148.x.y:4505	172.20.14.2:49610	4.2.2.2:53	4.2.2.2:53
tcp	166.148.x.y:4096	172.20.14.2:54282	173.243.x.y:443	173.243.x.y:443
...				
icmp	166.148.x.y:1	172.20.14.1:2	4.2.2.2:2	4.2.2.2:1
udp	166.148.x.y:4508	172.20.14.2:58967	92.242.x.y:3544	92.242.x.y:3544
udp	166.148.36.219:4574	172.20.14.2:58638	4.2.2.2:53	4.2.2.2:53

Total number of translations: 44

4331LTE#

4331LTE#sh cell 0/2/0 all

Hardware Information

=====

Modem Firmware Version = SWI9X15C\_05.05.58.01

Modem Firmware built = 2015/03/05 00:02:40

Hardware Version = 1.0

Device Model ID: MC7350

Package Identifier ID: 1102036\_9903208\_MC7350\_05.05.53.01\_00\_Cisco\_005.003\_000

International Mobile Subscriber Identity (IMSI) = 311480008312026

International Mobile Equipment Identity (IMEI) = 356732060030176

Integrated Circuit Card ID (ICCID) = 8914800000083183898

Mobile Subscriber Integrated Services

Digital Network-Number (MSISDN) = 215806xxxx

Current Modem Temperature = 34 deg C

PRI SKU ID = 9903208, PRI version = 05.03

Profile Information

=====

---

Profile 1 = INACTIVE \*\*

-----

PDP Type = IPv4v6

Access Point Name (APN) = vzwims

Authentication = None

Profile 2 = INACTIVE

-----

PDP Type = IPv4v6

Access Point Name (APN) = vzwadmin

Authentication = None

Profile 3 = ACTIVE\*

-----

PDP Type = IPv4v6

PDP address = 166.148.x.y

Access Point Name (APN) = ne01.VZWSTATIC

Authentication = None

    Primary DNS address = 198.224.x.y

    Secondary DNS address = 198.224.x.y

Profile 4 = INACTIVE

-----

PDP Type = IPv4v6

Access Point Name (APN) = vzwapp

Authentication = None

Profile 5 = INACTIVE

-----

PDP Type = IPv4v6

Access Point Name (APN) = vzw800

Authentication = None

\* - Default profile

\*\* - LTE attach profile

Data Connection Information

=====

Profile 1, Packet Session Status = INACTIVE

Profile 2, Packet Session Status = INACTIVE

Profile 3, Packet Session Status = ACTIVE

Cellular0/2/0:

Data Transmitted = 26377 bytes, Received = 322912 bytes

IP address = 166.148.x.y

Primary DNS address = 198.224.x.y

Secondary DNS address = 198.224.x.y

Profile 4, Packet Session Status = INACTIVE

Profile 5, Packet Session Status = INACTIVE

Profile 6, Packet Session Status = INACTIVE

Network Information

=====

Current System Time = Sat Aug 22 3:50:16 2015

Current Service Status = Normal

Current Service = Packet switched

Current Roaming Status = Home

Network Selection Mode = Automatic

Network = Verizon Wireless

Mobile Country Code (MCC) = 311

Mobile Network Code (MNC) = 480

Packet switch domain(PS) state = Attached

Registration state(EMM) = Registered

EMM Sub State = Normal Service

Tracking Area Code (TAC) = 25860

Cell ID = 25905409

Radio Information

=====

Radio power mode = ON

LTE Rx Channel Number = 5230

LTE Tx Channel Number = 23230

LTE Band = 13

LTE Bandwidth = 10 MHz

Current RSSI = -76 dBm

---

Current RSRP = -104 dBm  
Current RSRQ = -11 dB  
Current SNR = 3.6 dB  
Radio Access Technology(RAT) Preference = AUTO  
Radio Access Technology(RAT) Selected = LTE

Modem Security Information

=====  
Card Holder Verification (CHV1) = Disabled  
SIM Status = OK  
SIM User Operation Required = None  
Number of CHV1 Retries remaining = 3

GPS Information

=====

GPS Info

-----

GPS Feature: enabled  
GPS Port Selected: Dedicated GPS port  
GPS State: GPS acquiring  
GPS Mode Configured: standalone  
Last Location Fix Error: Offline [0x0]  
Latitude: 0 Deg 0 Min 0 Sec North  
Longitude: 0 Deg 0 Min 0 Sec East  
Timestamp (GMT): Sun Jan 6 00:00:00 1980

Fix type index: 0  
HDOP: , GPS Mode Used: unknown

Satellite Info

-----

SMS Information

=====

Incoming Message Information

-----

SMS stored in modem = 0



---

SMS archived since booting up = 0  
Total SMS deleted since booting up = 0  
Storage records allocated = 25  
Storage records used = 0  
Number of callbacks triggered by SMS = 0  
Number of successful archive since booting up = 0  
Number of failed archive since booting up = 0

Outgoing Message Information

-----  
Total SMS sent successfully = 0  
Total SMS send failure = 0  
Number of outgoing SMS pending = 0  
Number of successful archive since booting up = 0  
Number of failed archive since booting up = 0  
Last Outgoing SMS Status = SUCCESS  
Copy-to-SIM Status = 0x0  
Send-to-Network Status = 0x0  
Report-Outgoing-Message-Number:  
Reference Number = 0  
Result Code = 0x0  
Diag Code = 0x0 0x0 0x0 0x0 0x0

SMS Archive URL =

Error Information

=====

This command is not supported on 4G modems.

Modem Crashdump Information

=====

Modem crashdump logging: off

4331LTE#sh dialer

Ce0/2/0 - dialer type = DIALER CWAN

Idle timer (never), Fast idle timer (20 secs)

---

Wait for carrier (30 secs), Re-enable (15 secs)  
Dialer state is data link layer up  
Dial reason: Dialing on watched route loss  
Time until disconnect never  
Current call connected 00:18:48  
Connected to lte

Dial String	Successes	Failures	Last DNIS	Last status
lte	2	6	00:18:48	successful

4331LTE#

4331LTE#[sh version](#)

Cisco IOS XE Software, Version 03.16.00.S - Extended Support Release

Cisco IOS Software, ISR Software (X86\_64\_LINUX\_IOSD-UNIVERSALK9-M), Version 15.5(3)S, RELEASE SOFTWARE (fc6)

Technical Support: <http://www.cisco.com/techsupport>

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Compiled Sun 26-Jul-15 21:46 by mcpre

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ROM: IOS-XE ROMMON

4331LTE uptime is 11 minutes

Uptime for this control processor is 12 minutes

System returned to ROM by reload

System image file is "bootflash:isr4300-universalk9.03.16.00.S.155-3.S-ext.SPA.bin"

Last reload reason: PowerOn

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: <http://www.cisco.com/wwl/export/crypto/tool/stqrg.html>

If you require further assistance please contact us by sending email to [export@cisco.com](mailto:export@cisco.com).

Suite License Information for Module:'esg'

Suite	Suite Current	Type	Suite Next reboot
FoundationSuiteK9 securityk9 appxk9	None	None	None
AdvJCSuiteK9 uck9 cme-srst cube	None	None	None

Technology Package License Information:

Technology	Technology-package Current	Technology-package Type	Technology-package Next reboot
appxk9	appxk9	EvalRightToUse	appxk9
uck9	None	None	None
securityk9	None	None	None
ipbase	ipbasek9	Permanent	ipbasek9

cisco ISR4331/K9 (1RU) processor with 1659588K/6147K bytes of memory.  
Processor board ID FLM1927W10P

---

3 Gigabit Ethernet interfaces  
1 Cellular interface  
32768K bytes of non-volatile configuration memory.  
4194304K bytes of physical memory.  
3223551K bytes of flash memory at bootflash.

Configuration register is 0x2102




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