DMNR in the EN-4000

This document discusses implementation of dynamic mobile network routing (DMNR) in the EN-4000.

Encore Networks' EN-4000 complies with all Verizon Wireless requirements for DMNR, with the following exception: The EN-4000 has received a waiver for a Network Mobility (NEMO) instruction for DF bit handling. (See Section 11.2, *Notes on Network Mobility*.)

11.1 Setting Up DMNR

Before setting up DMNR on this EN-4000, consult the document *Configuring General Settings for the EN-4000* to set up the EN-4000 as a standard cellular router.

Note: Get all parameter values from your network administrator.

1 On the EN-4000 management system, select the **Network** tab.

2 Then select the **DMNR** tab.

❖ The DMNR Configuration Screen is displayed (Figure 11-1).

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Figure 11-1. DMNR Configuration Screen

3 On the DMNR Configuration Screen, under the heading **DMNR Parameters**, configure the following items.

- **DMNR Enabled**   Yes

- **Authorization Key**   **VzWNeMo** (the only valid value for this parameter), the character string used for access to the mobile network.

- **Home Agent** (HA)   The IP address for registering the mobile device on the mobile private network (MPN). If this value is not provided as port of the account details, consult your Verizon Wireless sales architect.

- **Lifetime**   **65534** (the only valid value for this parameter), the number of seconds until the authorization key expires.

- **SPI**   **256** (the only valid value for this parameter), the security parameter index.

- **Home IP Address**   A dummy non-routable address. **1.2.3.4** is the recommended value.

- **Mode**   Select **Primary** to route all traffic through the cellular wireless connection.

                                 Select **Backup** to route all traffic through the cellular wireless connection if the Ethernet WAN connection fails.

                                 Note: In Backup Mode, traffic is routed through the Ethernet WAN connection unless that connection fails.

- **Test IP Address**   The IP address for testing the condition of the Ethernet WAN connection.

  Note: This parameter is applicable only if the **Mode** is **Backup**, and this parameter is displayed only in that case.

- **Retry Timer**   After sending a registration request (RRQ), the number of seconds to wait for a registration response before sending another RRQ.

- **Periodic Timer**   The range for this value is **1** to **60** seconds.

  After successful establishment of the DMNR tunnel, registration requests are issued this many seconds prior to the lifetime value provided by the HA server. For example, if the lifetime provided by the HA server is 600 seconds and this periodic timer value is **30** seconds, registration requests are sent every 570 seconds (600 minus 30).

  Note: The lifetime value provided by the HA server is not the authorization key **Lifetime** value indicated above.

- **Error Count**   The maximum number of unsuccessful registration request attempts before a pause of 60 seconds. (After that pause, the error count resets and the registration requests resume.) The error count is typically set to **3**.

4 Under the heading **DMNR Prefix Table**, view the prefix table.

5 Do one of the following:

  a If you wish to modify a record, make the changes in one or more fields of that record.

  b If you wish to delete a record, select the **Delete** button at the far right of that record.

  c If you wish to add a record, select the **Add** button at the lower left of the screen.

  ❖ A new, empty record is displayed. Perform step 5 for that new record.

6 When you have finished configuring the DMNR parameters and prefix table, select the **Save & Apply** button.

  ❖ The changes are saved and are used immediately.

7 On the EN-4000 management system, select the **Network** tab.

8 Then select the **Static Routes** tab.

  ❖ The Static Routes Screen is displayed (Figure 11-2).

Figure 11-2. Static Routes Screen
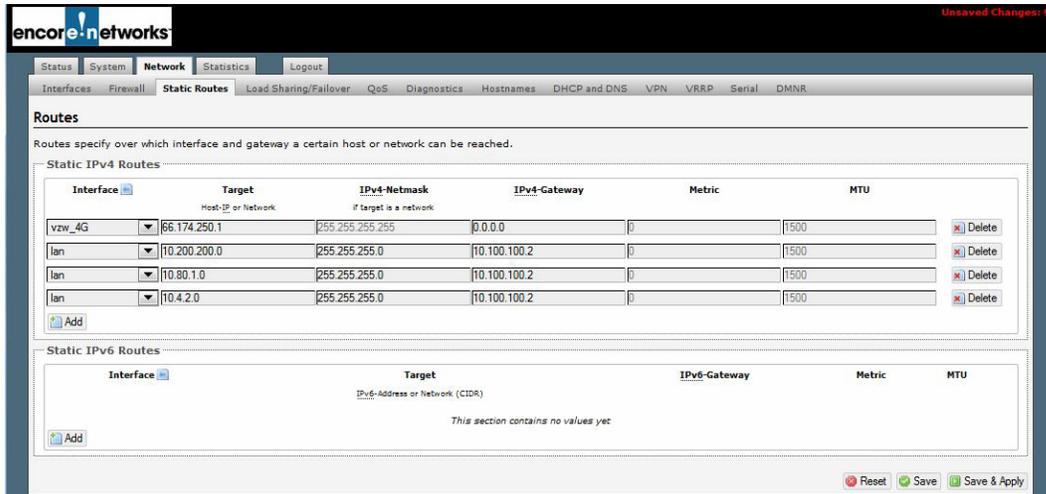
9   Under the heading **Static IPv4 Routes**, view the static routing table.

10 Do one of the following:

  a If you wish to modify a record, make the changes in one or more fields of that record.

  b If you wish to delete a record, select the **Delete** button at the far right of that record.

  c If you wish to add a record, select the **Add** button at the lower left of the screen.

     ❖ A new, empty record is displayed. Perform step 10 for that new record.

11 When you have finished configuring the static routing table, select the **Save & Apply** button.

     ❖ The changes are saved and are used immediately.

12 On the EN-4000 management system, select the **Network** tab.

13 Then select the **Interfaces** tab.

     ❖ The Network Interfaces Screen is displayed (Figure 11-3).

Figure 11-3. Network Interfaces Screen
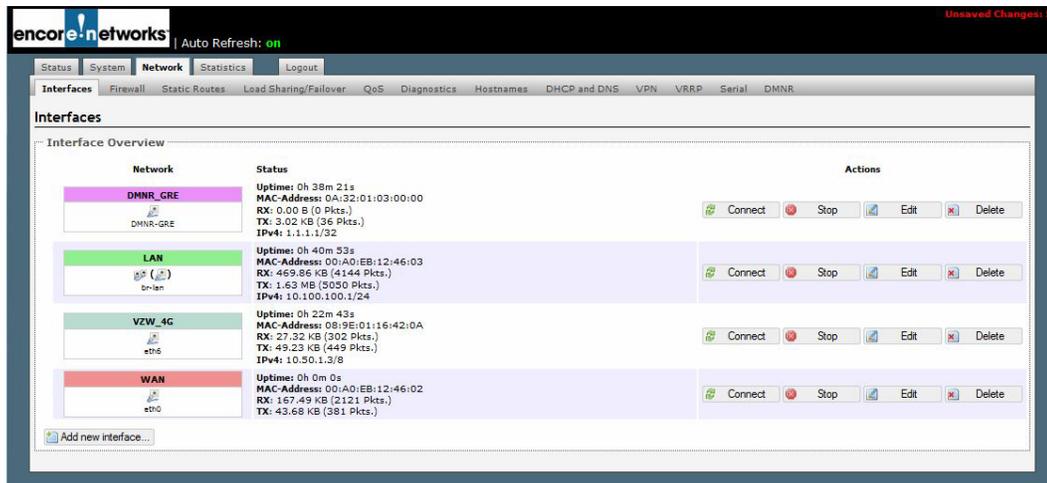
14   On that screen, review the EN-4000's connections. If you wish to modify an interface, select its **Edit** button near the right of the screen.

Note: For information on configuring a port interface, see the document *Configuring Chassis Ports in the EN-4000*.

11.2 Notes on Network Mobility

Encore Networks' EN-4000 complies with all Verizon Wireless requirements for DMNR, with the following exception: The EN-4000 has received a waiver for a Network Mobility (NEMO) instruction for DF bit handling.

Use of DMNR in the EN-4000 does not support clearing the DF bit (the "don't fragment" bit) and fragmenting the packets routed over the DMNR tunnel. That situation will not affect most applications. In this section, we provide information for customers to use NEMO with DMNR in the EN-4000.

Most common applications that use the DF bit are TCP-based applications. Most non-TCP applications do not use the DF bit. For applications that fail because of the NEMO-MTU-3 requirement,[1] the maximum transmission unit (MTU) value can be set to a lower value to allow successful transmissions.

The EN-4000 supports standards-based enforcement of Path MTU Discovery (PMTUD) and it supports adjustment of the maximum segment size (MSS) to let TCP applications work properly over the DMNR tunnel. Most TCP applications—even those that require the DF bit to be set—work with the MSS and PMTUD features of the EN-4000. PMTUD is supported by default in most end devices.

You can set both PMTUD and MSS for the same connection. If the remote device does not use PMTUD, MSS will be used automatically.

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1. The NEMO-MTU-3 requirement states that the "NEMO MR [mobile router] shall provide a capability to force IP packet fragmentation for packets that are to be encapsulated on a NEMO-Tunnel, and that exceed the tunnel's MTU and have the DF-bit set." [Berzin, Oleg: *Private Network Dynamic Mobile Network Routing: Standards-Based (RFC 5177) Mobile IPv4 NEMO Implementation and Technical Service Requirements for CPE Routers*, version 1.2, Verizon Wireless, 2011, p. 21]

PMTUD: The EN-4000 sends an "ICMP [Internet Control Message Protocol] unreachable" message to make the end devices adjust the segment size until the right segment size is reached.

MSS: If a remote device does not support PMTUD, the EN-4000 uses the MSS adjustment feature to lower the maximum segment size below the DMNR tunnel's MTU size, allowing standard TCP applications to work properly over the DMNR tunnel. MSS clamping can be configured in the firewall section of the interface.

To set the MSS, open the EN-4000's Network screen, and select **Firewall**, **General Settings**. For the DMNR_GRE zone (the bottom row in Figure 11-4), check the box for **MSS Clamping**.

Figure 11-4. Screen for Firewall Zone Settings (Including MSS Clamping)
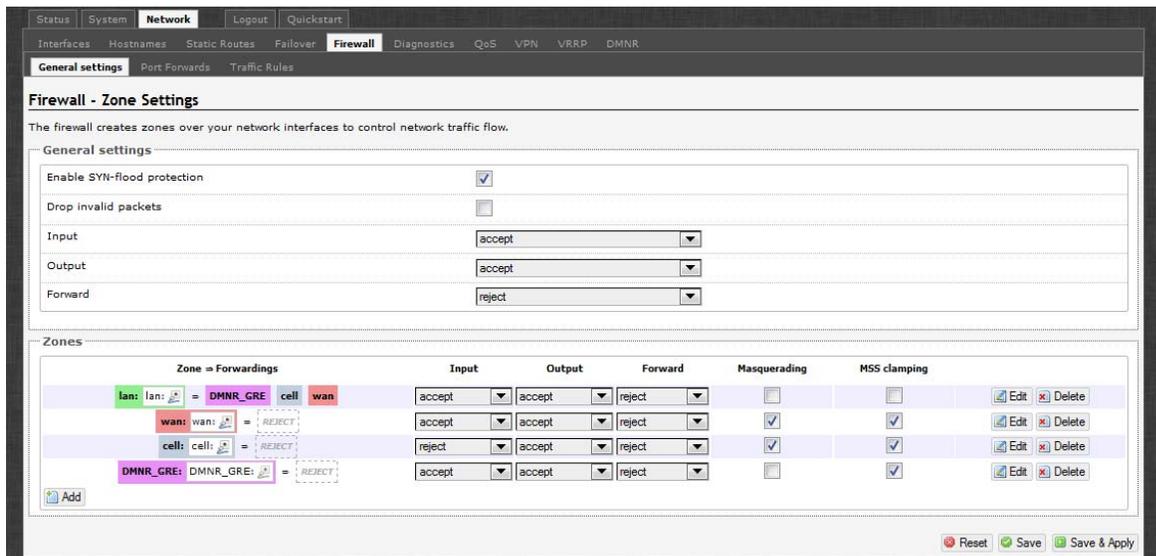
If MSS clamping is selected in Figure 11-4, the MSS value is determined by the lower of the following (as indicated in Figure 11-5):

- the PMTUD requirement
- the MTU of the remote interface

You can also use a customized rule to force the MSS to a specific value (also indicated in Figure 11-5).

Figure 11-5. Custom Rule for Firewall
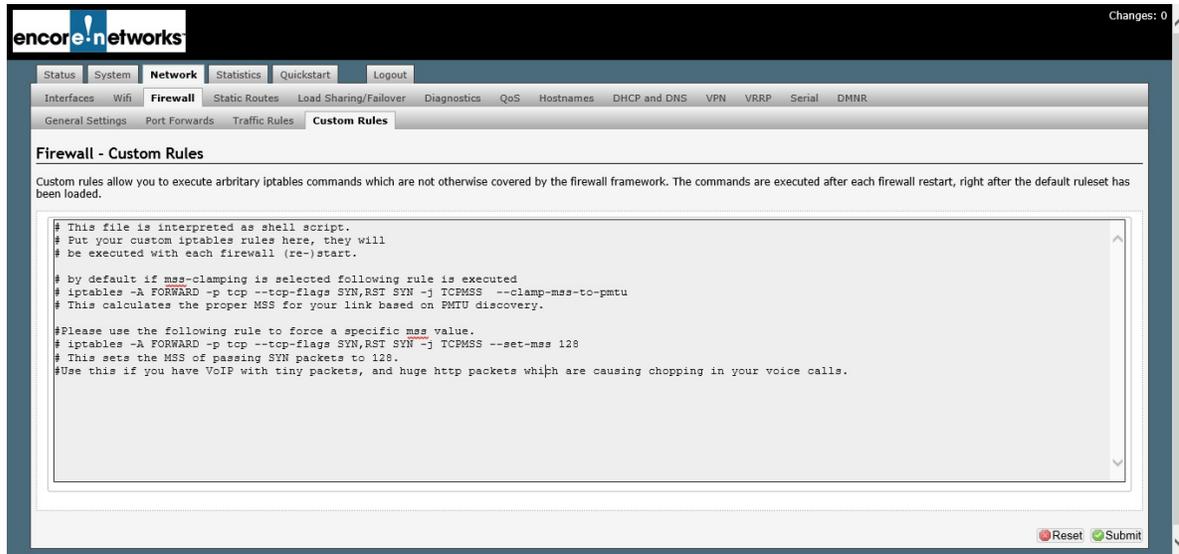
For non-TCP applications that require setting the DF bit, the maximum packet size using a set DF bit might be the only MTU size for the remote device. For these applications, the MTU on the end devices can be adjusted to be at least 24 bytes lower than the EN-4000 DMNR_GRE interface. For example, if the PC is an end device with an MTU of 1500 bytes, and the EN-4000 DMNR_GRE interface MTU is 1500, the PC's MTU can be set to 1476.

Note: A change in the MTU setting is not required unless non-TCP transmissions encounter problems over the DMNR connection.

To set the MTU, open the EN-4000's Network screen, and select the **Interfaces** tab. In the field for **Override MTU**, type the MTU size (in bytes) to use.

Figure 11-6. DMNR GRE Interface