

## Recommended MTU setting on LTE Networks

### Summary

MTU is a networking term that defines the largest packet size that can be sent over a network connection. By changing the MTU size, you can achieve greater reliability when using LTE data services by avoiding fragmentation. The default setting of MTU size on BEC 4G/LTE routers is 1428 to accommodate for all carriers. Please change to different MTU size if your carrier provides the different MTU size.

### Recommended MTU size by Carriers

AT&T MTU 1420

Verizon MTU 1428

T-Mobile MTU 1440

### GRE Tunnel MTU configuration example


To find out the right MTU size for GRE tunnel. You need to know the overhead value for GRE. The overhead value for GRE is 24 Bytes (4 bytes GRE header and 20 bytes IP header). So, if your outbound physical interface is configured for 1428, then your GRE tunnel MTU should be 1404. 24 bytes less the physical. The reason for tunnel MTU to be 24 bytes lower than physical interface MTU is because GRE tunnel interface will add another 24 bytes as overhead before handing it down to the physical interface for transmission. Here are some overhead values for the different protocol.

- IP header overhead – 20 Bytes
- TCP header overhead – 20 Bytes
- IPSEC header overhead – 56 Bytes
- GRE header overhead – 24 Bytes

## Finding correct MTU Values for your WAN

The MTU feature on the router allows you to determine the biggest data size permitted on your connection. Generally, if your MTU value is too big for the connection, your router will experience packet loss or drop of Internet connection. To find correct MTU values for your connection, you can simply send out ping request and progressively lower down your packet size until it no longer needs to be fragmented.

At the command window, type in the command “ping **8.8.8.8 -f -l 1500**”, if you see “**Packet needs to be fragmented but DF set**”, drop the packet size down by 20 bytes and test again until you get a good response.

 Command Prompt

```
Microsoft Windows [Version 10.0.18363.778]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\becus>ping 8.8.8.8 -f -l 1500

Pinging 8.8.8.8 with 1500 bytes of data:
Packet needs to be fragmented but DF set.
Packet needs to be fragmented but DF set.
Packet needs to be fragmented but DF set.
Packet needs to be fragmented but DF set.

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\Users\becus>
```

Drop the packet size down to 1480.

```
C:\Users\becus>ping 8.8.8.8 -f -l 1480

Pinging 8.8.8.8 with 1480 bytes of data:
Packet needs to be fragmented but DF set.
Packet needs to be fragmented but DF set.
Packet needs to be fragmented but DF set.
Packet needs to be fragmented but DF set.

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\Users\becus>
```

Drop the packet size down to 1460.

```
C:\Users\becus>ping 8.8.8.8 -f -l 1460

Pinging 8.8.8.8 with 1460 bytes of data:
Reply from 8.8.8.8: bytes=68 (sent 1460) time=5ms TTL=55
Reply from 8.8.8.8: bytes=68 (sent 1460) time=5ms TTL=55
Reply from 8.8.8.8: bytes=68 (sent 1460) time=4ms TTL=55
Reply from 8.8.8.8: bytes=68 (sent 1460) time=5ms TTL=55

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 5ms, Average = 4ms
```

When you reached the packet size which does not fragment, begin increasing the packet size from this number in small increments until you find the largest size that does not fragment.

```
C:\Users\becus>ping 8.8.8.8 -f -l 1472

Pinging 8.8.8.8 with 1472 bytes of data:
Reply from 8.8.8.8: bytes=68 (sent 1472) time=5ms TTL=55
Reply from 8.8.8.8: bytes=68 (sent 1472) time=4ms TTL=55
Reply from 8.8.8.8: bytes=68 (sent 1472) time=5ms TTL=55
Reply from 8.8.8.8: bytes=68 (sent 1472) time=4ms TTL=55

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 5ms, Average = 4ms
```

Add 28 bytes to the number (1472) to get the optimal MTU setting. Please note that 28 bytes are added for IP header (20 bytes) and ICMP header (8 bytes). In this case example:

- 1472 Max packet size from the ping test
- 28 bytes for IP/ICMP headers
- $1472 + 28 = 1500$  is the optimum MTU setting for your WAN.

## Configuration

To change MTU on the BEC route, please follow the steps below:

### From router's Web GUI:

Step 1: Log into router's Web GUI page.

Step 2: Click on the **Configuration / Interface Setup / Internet**

<ul style="list-style-type: none"> <li>▶ Status</li> <li>▶ Quick Start</li> <li>▶ Configuration             <ul style="list-style-type: none"> <li>▼ Interface Setup                 <ul style="list-style-type: none"> <li>• Internet</li> <li>• LAN</li> <li>• Loopback</li> </ul> </li> <li>▶ Dual WAN</li> <li>▶ Advanced Setup</li> <li>▶ VPN</li> <li>▶ Access Management</li> <li>▶ Maintenance</li> </ul> </li> </ul>	<table border="1"> <tr><td>Username</td><td><input type="text"/></td></tr> <tr><td>Password</td><td><input type="password"/></td></tr> <tr><td>PIN</td><td><input type="text"/></td></tr> <tr><td>Connection</td><td><input checked="" type="radio"/> Always On (Recommended)</td></tr> <tr><td>Keep Alive</td><td><input type="radio"/> Yes <input checked="" type="radio"/> No</td></tr> <tr><td>Keep Alive IP</td><td><input type="text"/> Check Interval 5 x <input type="text"/> 1 Seconds</td></tr> <tr><td>Background Ping</td><td><input type="radio"/> Yes <input checked="" type="radio"/> No</td></tr> <tr><td>Background Ping IP</td><td><input type="text"/> Interval <input type="text"/> Seconds</td></tr> <tr><td>Default Route</td><td><input checked="" type="radio"/> Yes <input type="radio"/> No</td></tr> <tr><td>Second APN as Default Route</td><td><input type="radio"/> Yes <input checked="" type="radio"/> No</td></tr> <tr><td>NAT</td><td>Enable ▼</td></tr> <tr><td><b>MTU</b></td><td><input type="text" value="1428"/> (0 means use default:1500)</td></tr> <tr><td colspan="2" style="text-align: center;">Save</td></tr> </table>	Username	<input type="text"/>	Password	<input type="password"/>	PIN	<input type="text"/>	Connection	<input checked="" type="radio"/> Always On (Recommended)	Keep Alive	<input type="radio"/> Yes <input checked="" type="radio"/> No	Keep Alive IP	<input type="text"/> Check Interval 5 x <input type="text"/> 1 Seconds	Background Ping	<input type="radio"/> Yes <input checked="" type="radio"/> No	Background Ping IP	<input type="text"/> Interval <input type="text"/> Seconds	Default Route	<input checked="" type="radio"/> Yes <input type="radio"/> No	Second APN as Default Route	<input type="radio"/> Yes <input checked="" type="radio"/> No	NAT	Enable ▼	<b>MTU</b>	<input type="text" value="1428"/> (0 means use default:1500)	Save	
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Step 3: Click "Save" to save the change.

GRE Tunnel MTU:

Go to **Configuration / VPN / GRE**

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From BECentral Cloud management Portal:

Select the device you want to change and go to **Device / Configuration**

The screenshot shows the 'Device List' interface. At the top, there are buttons for 'Command', 'Device', and 'Select All', along with a 'Selected : 1' indicator. A search bar is present. Below the search bar, a dropdown menu is open, showing options: Configuration (highlighted), Analysis, Alerts Policy, Network, System Log, Address, Edit Name, Edit Tags, and Out-of-Band Management. The table below has columns for Model, MAC, and IP. The 'MX-200A' device is selected.

Model	MAC	IP
MX-1200	600[REDACTED]	100[REDACTED]
MX-210NP	600[REDACTED]	10[REDACTED]
RidgeWave 6900	600[REDACTED]	192[REDACTED]
MX-200Ae	600[REDACTED]	166[REDACTED]
MX-200A	600[REDACTED]	25[REDACTED]

Click on Configuration and you will get a pop-up window.

The screenshot shows the 'Device Configuration' window. The 'Interface' tab is active, and the 'Internet' sub-tab is selected. The 'PDN Type' is set to 'IPv4'. The 'Authentication Protocol' is set to 'Disable'. The 'Connection' section is expanded, showing 'Keep Alive' set to 'NO', 'Default Route' set to 'YES', and 'NAT' set to 'Enable'. The 'MTU' field is highlighted in yellow, with the value '1428' entered. Below the field, it says '(0 means use default 1500)'. At the bottom right, there are 'Apply Setting' and 'Close' buttons.

Put in your MTU and click "Apply Setting"