

Check Point Security Gateway to utilize an IPv6 Tunnel Broker – Configuration Guide

Nate Ressel
Security Engineer

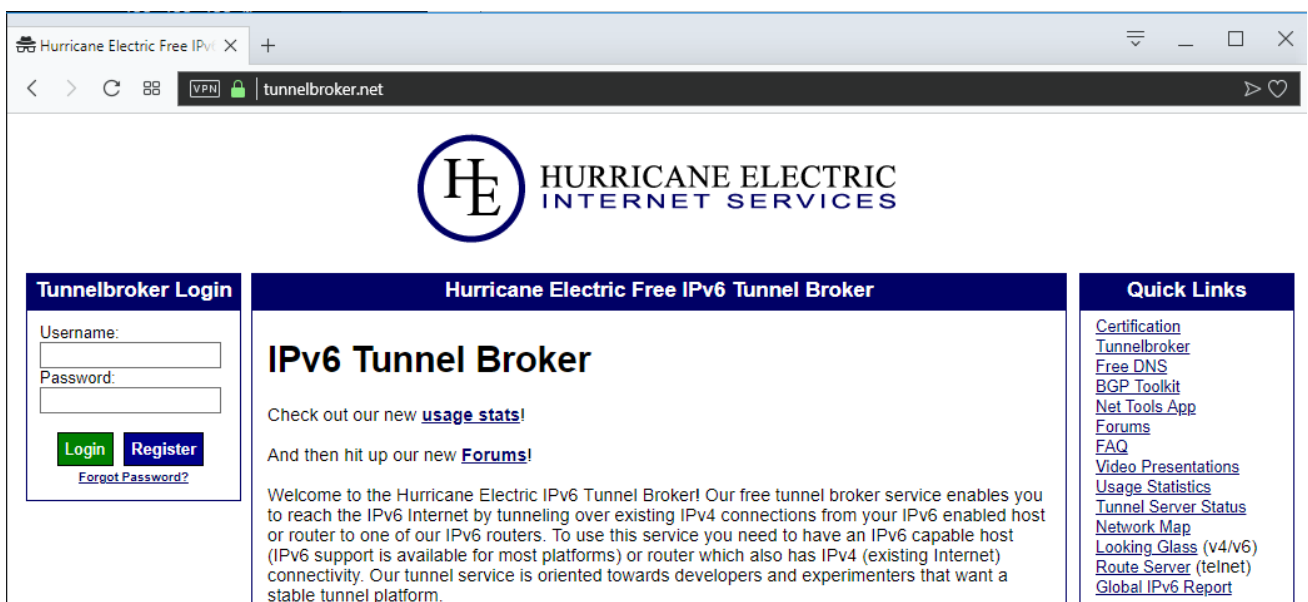
Not all Internet Service Providers are utilizing IPv6 today. This document provides walk through the process of creating a Hurricane Electric Tunnel Broker account and the configuration on your R80 gateway to utilize an IPv6 address space.

About Hurricane Electric:

Hurricane Electric operates its own global IPv4 and IPv6 network and is considered the largest IPv6 backbone in the world as measured by number of networks connected. Within its global network, Hurricane Electric is connected to over 200 major exchange points and exchanges traffic directly with more than 7,300 different networks. Employing a resilient fiber-optic topology, Hurricane Electric has no less than five redundant 100G paths crossing North America, five separate 100G paths between the U.S. and Europe, and 100G rings in Europe and Asia. Hurricane also has a ring around Africa, and a PoP in Australia. In addition to its vast global network, Hurricane Electric owns and operates two data centers in Fremont, California - including [Hurricane Electric Fremont 2](#), its newest 200,000 square-foot facility. Hurricane Electric offers IPv4 and IPv6 transit solutions over the same connection. Connection speeds available include 100GE (100 gigabits/second), 10GE, and gigabit ethernet.

Creating a free IPv6 Tunnel Broker Account:

- 1) Proceed to tunnelbroker.net and click on the blue register button.



The screenshot shows a web browser window with the URL tunnelbroker.net. The page features the Hurricane Electric Internet Services logo at the top center. Below the logo, there are three main sections: 'Tunnelbroker Login' on the left, 'Hurricane Electric Free IPv6 Tunnel Broker' in the center, and 'Quick Links' on the right. The 'Tunnelbroker Login' section contains input fields for 'Username:' and 'Password:', a 'Forgot Password?' link, and 'Login' and 'Register' buttons. The central section has a heading 'IPv6 Tunnel Broker' and text that says 'Check out our new [usage stats!](#)' and 'And then hit up our new [Forums!](#)'. Below this is a welcome message: 'Welcome to the Hurricane Electric IPv6 Tunnel Broker! Our free tunnel broker service enables you to reach the IPv6 Internet by tunneling over existing IPv4 connections from your IPv6 enabled host or router to one of our IPv6 routers. To use this service you need to have an IPv6 capable host (IPv6 support is available for most platforms) or router which also has IPv4 (existing Internet) connectivity. Our tunnel service is oriented towards developers and experimenters that want a stable tunnel platform.' The 'Quick Links' section lists various resources: [Certification](#), [Tunnelbroker](#), [Free DNS](#), [BGP Toolkit](#), [Net Tools App](#), [Forums](#), [FAQ](#), [Video Presentations](#), [Usage Statistics](#), [Tunnel Server Status](#), [Network Map](#), [Looking Glass \(v4/v6\)](#), [Route Server \(telnet\)](#), and [Global IPv6 Report](#).

2) Fill out your personal information as requested.

HE.net IPv6 Tunnel Broker Registration

Registering will give you access to the following services:

- ipv6.he.net/certification
- tunnelbroker.net
- dns.he.net
- math.he.net

If you have already registered for one of them, you may login with those credentials without registering again.

After completing registration, an email will be sent to complete activating your account.

*** = Required Information**

* Account Name:

* Password:

* Confirm Password:

* Email:

* First Name:

* Last Name:

Company Name:

* Country:

* Address:

* City:

* State:

* ZIP/Postal Code:

* Phone:

I have read and agreed to the [Terms of Service](#)

Quick Links

- [Certification](#)
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Services

- [Transit](#)
- [Colocation](#)
- [Dedicated Servers](#)

v4 Exhaustion

IPv4 & IPv6 Statistics

RIR	v4 IPs Left
AfriNIC	6,710,418
APNIC	3,937,017
ARIN	0
LACNIC	1,463,970
RIPE	5,974,222

v6 ASNs
23% (13,993/58,955)

v6 Ready TLDs
98% (1,521/1,547)

v6 Glues
154,606

v6 Domains
10,375,560

3) Check your email and click on the link to validate your email provided.

4) Log into tunnelbroker.net with your newly activated account.

5) Click on 'Create Regular Tunnel' under 'User Functions' on the left side of the page.

Hurricane Electric Free IPv6 Tunnel Broker

Name: Nate Ressel
User ID: tb5c2aaf0eba6a08.12645095

HE.NET IPv6 Certified
No Cert Yet
cphedemo

Account Menu

- [Main Page](#)
- [Account Info](#)
- [Logout](#)

User Functions

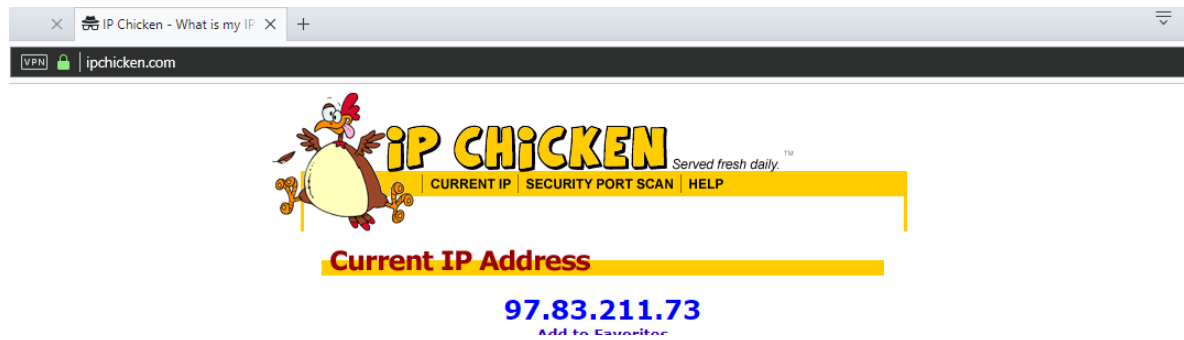
- [Create Regular Tunnel](#)
- [Create BGP Tunnel](#)
- [IPv6 Portscan](#)

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To create this new tunnel enter in your external IPv4 address.

- a. You can find your external address easily from the following sites.
 - i. ipchicken.com
 - ii. whatsmyip.com



- 6) Now enter your external address, select the HE.net location closest to you and click 'Create Tunnel'



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Create Regular Tunnel
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Create New Tunnel

You currently have 0 of 5 tunnels configured.

- If you are trying to reclaim a tunnel simply use your last IPv4 address here. If you have any issues please email ipv6@he.net.
- If you have a public ASN and wish to setup a full BGP feed, please use [this form](#) instead.

IPv4 Endpoint (Your side): IP is a potential tunnel endpoint.

You are viewing from: 2001:470:c055:0:89aa:3019:6fa2:fb7c

Available Tunnel Servers:

North America	
<input type="radio"/> Ashburn, VA, US	216.66.22.2
<input type="radio"/> Calgary, AB, CA	216.218.200.58
<input checked="" type="radio"/> Chicago, IL, US	184.105.253.14
<input type="radio"/> Dallas, TX, US	184.105.253.10
<input type="radio"/> Denver, CO, US	184.105.250.46
<input type="radio"/> Fremont, CA, US	72.52.104.74
<input type="radio"/> Fremont, CA, US	64.62.134.130
<input type="radio"/> Honolulu, HI, US	64.71.156.86
<input type="radio"/> Kansas City, MO, US	216.66.77.230
<input type="radio"/> Los Angeles, CA, US	66.220.18.42
<input type="radio"/> Miami, FL, US	209.51.161.58
<input type="radio"/> New York, NY, US	209.51.161.14
<input type="radio"/> Phoenix, AZ, US	66.220.7.82
<input type="radio"/> Seattle, WA, US	216.218.226.238
<input type="radio"/> Toronto, ON, CA	216.66.38.58
<input type="radio"/> Winnipeg, MB, CA	184.105.255.26
Europe	
<input type="radio"/> Amsterdam, NL	216.66.84.46
<input type="radio"/> Berlin, DE	216.66.86.114
<input type="radio"/> Budapest, HU	216.66.87.14
<input type="radio"/> Frankfurt, DE	216.66.80.30
<input type="radio"/> Lisbon, PT	216.66.87.102
<input type="radio"/> London, UK	216.66.80.26
<input type="radio"/> London, UK	216.66.88.98
<input type="radio"/> Paris, FR	216.66.84.42
<input type="radio"/> Prague, CZ	216.66.86.122
<input type="radio"/> Stockholm, SE	216.66.80.90
<input type="radio"/> Warsaw, PL	216.66.80.162
<input type="radio"/> Zurich, CH	216.66.80.98
Asia	
<input type="radio"/> Hong Kong, HK	Not Available (Full)
<input type="radio"/> Singapore, SG	Not Available (Full)
<input type="radio"/> Tokyo, JP	74.82.46.6
Africa	
<input type="radio"/> Djibouti City, DJ	216.66.87.98
<input type="radio"/> Johannesburg, ZA	216.66.87.134
South America	
<input type="radio"/> Bogota, CO	216.66.64.154
Oceania	
<input type="radio"/> Sydney, NSW, AU	216.218.142.50
Middle East	
<input type="radio"/> Dubai, AE	216.66.90.30

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Services

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23% (13,993/58,955)

v6 Ready TLDs
98% (1,521/1,547)

v6 Glues
154,606

v6 Domains
10,375,574

0

days remaining
IANA exhausted

HURRICANE ELECTRIC

7) You will then be provided with all of the information for your IPv6 tunnel and assigned address space.



Account Menu

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- Create BGP Tunnel
- IPv6 Portscan

Tunnel Details

IPv6 Tunnel | Example Configurations | Advanced

Tunnel ID: 515850 Delete Tunnel
 Creation Date: Dec 31, 2018
 Description:

IPv6 Tunnel Endpoints

Server IPv4 Address: 184.105.253.14
 Server IPv6 Address: 2001:470:1f10:5b3::1/64
 Client IPv4 Address: **97.83.211.72**
 Client IPv6 Address: 2001:470:1f10:5b3::2/64

Routed IPv6 Prefixes

Routed /64: 2001:470:1f11:5b3::/64
 Routed /48: **Assign /48**

DNS Resolvers

Anycast IPv6 Caching Nameserver: 2001:470:20::2
 Anycast IPv4 Caching Nameserver: 74.82.42.42

rDNS Delegations Edit

rDNS Delegated NS1:
 rDNS Delegated NS2:
 rDNS Delegated NS3:
 rDNS Delegated NS4:
 rDNS Delegated NS5:

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v6 ASNs

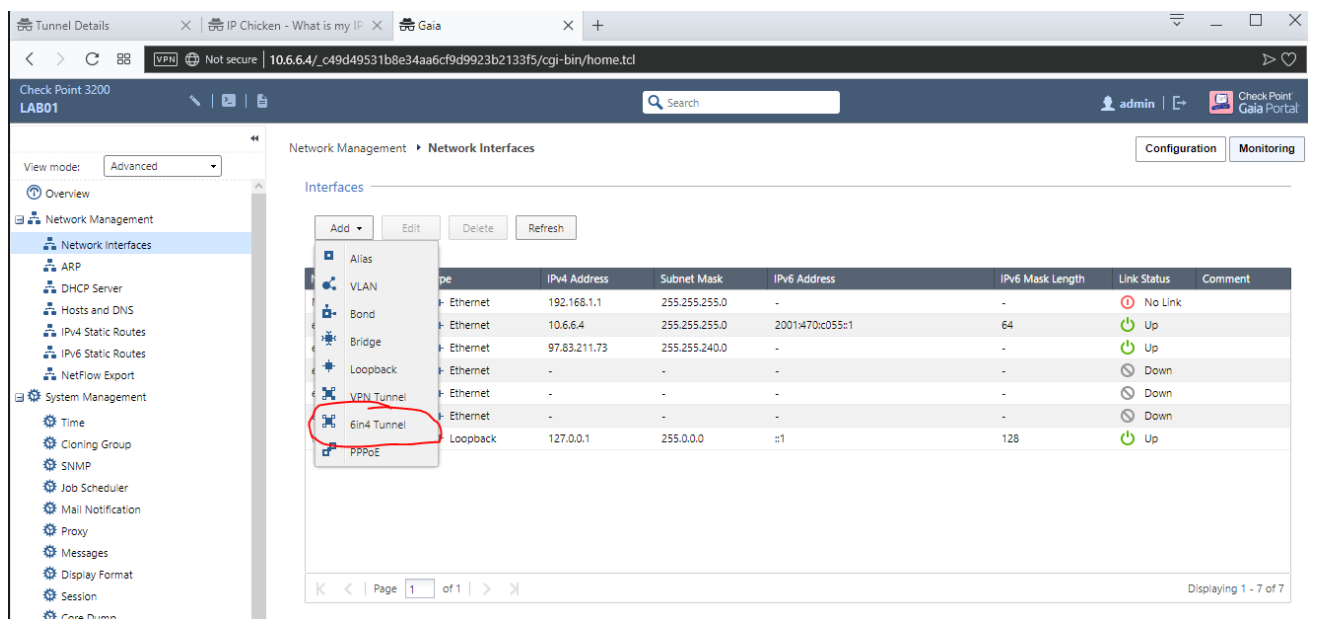
Configuring Check Point Gateway

Configuration Via Gaia GUI:

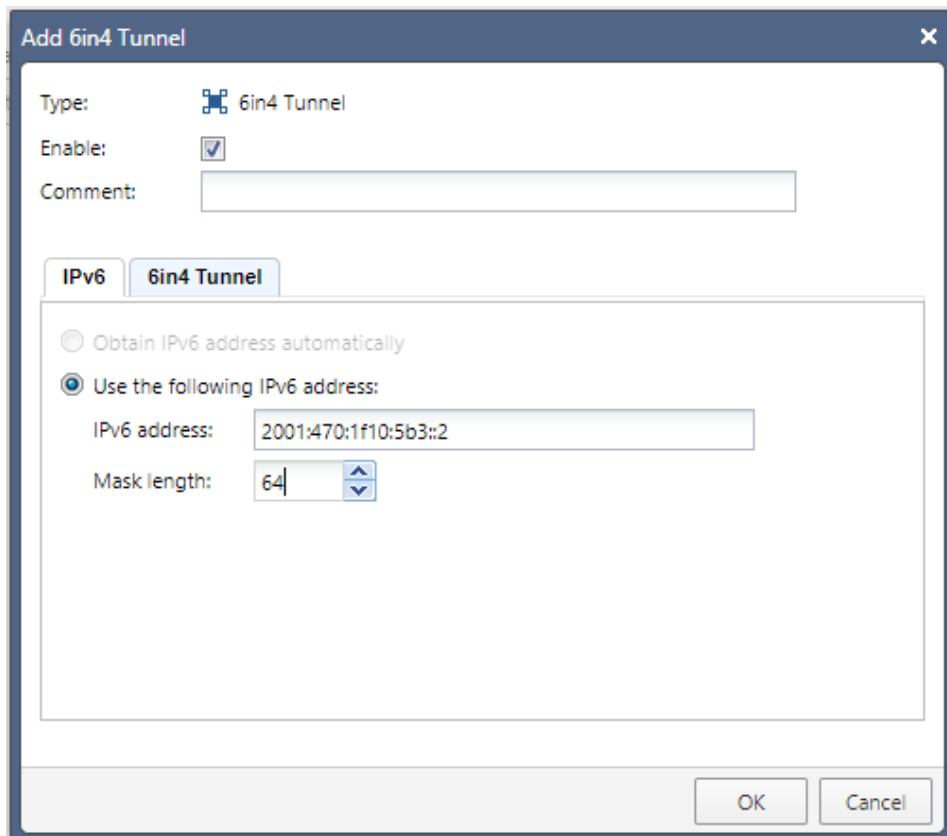
- 1) Log into the Gaia portal on the Gateway you want to configure.
- 2) Click on 'Network Interfaces'.



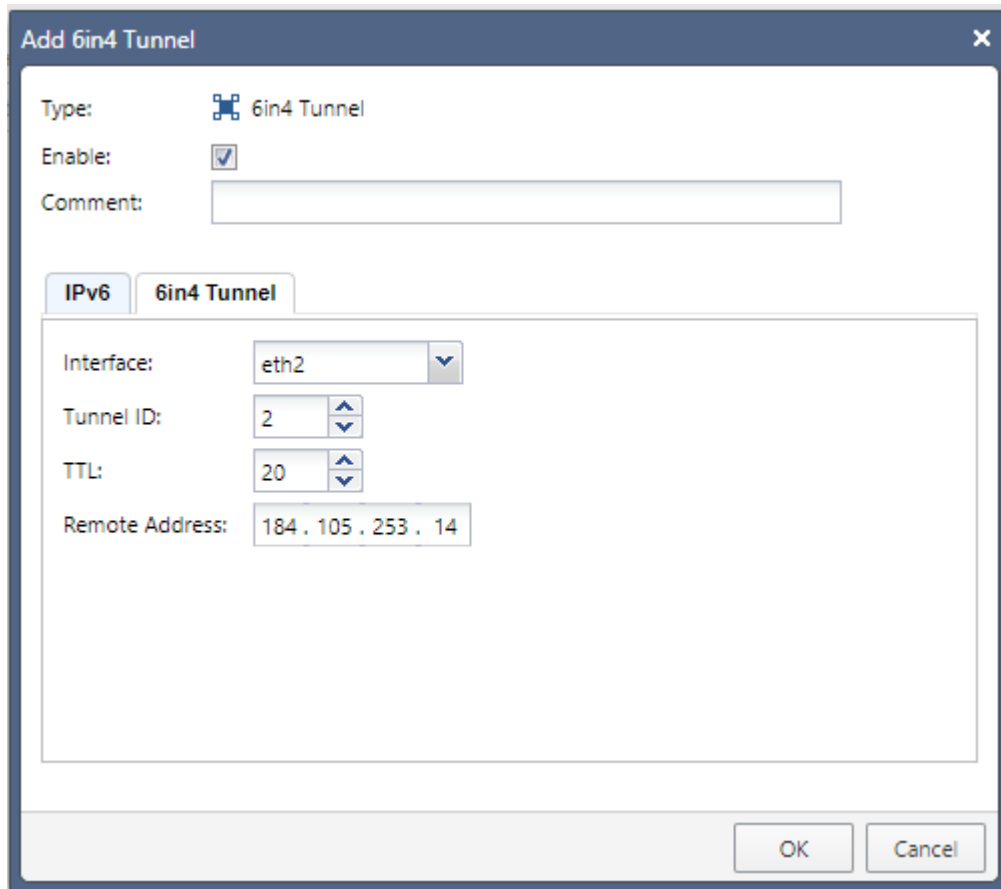
- 3) Click 'Add' and select '6in4 Tunnel'



- 4) Enter the 'Client IPv6 address' as provided from HE



- 5) Select the '6in4 Tunnel' Tab and configure the following:
 - a. Interface – This is your external interface on the Gateway.
 - b. Tunnel ID – Use any ID that is not in use.
 - c. TTL – Set this higher as a low number can cause issues depending on the number of hops you are away from your local HE Datacenter.
 - d. Remote Address – Set this as provided by HE labeled 'Server IPv4 Address' under 'IPV6 Tunnel Endpoints'



- 6) In Gaia click on 'IPv6 Static Routes'.
- 7) Set the Default Route to the Gateway provided by HE listed as 'Server IPv6 Address' under 'IPv6 Tunnel Endpoints'.

Configuration Via CLI:

- 1) Log into the CLI via SSH or console and enter the following commands.

```

set ipv6-state on
# MAY REQUIRE REBOOT
add interface {local IPv4 interface name} 6in4 {ID (2-999999)} remote
184.105.253.14 ttl 20
set interface sit_6in4_ID state on
set interface sit_6in4_ID mtu 1480
set interface sit_6in4_ID ipv6-address 2001:470:1f10:5b3::2 mask-length 64
set interface sit_6in4_ID comments "HE.NET IPv6 Tunnel"
set ipv6 static-route default nexthop gateway 2001:470:1f10:5b3::1 priority 1 on

```


Complete

You now have successfully created a tunnel to Hurricane Electric to use your own IPv6 address space. To utilize IPv6 fully you should implement a DHCP scope for the address space provided or assign static addresses to all of your devices.

Troubleshooting

Tunnel not passing traffic. Interface shows as up in Gaia, but link not available via CLI 'show interface sit_6in4_2'

```
LAB01> show interface sit_6in4_2
state on
mac-addr Not configured
type 6in4
link-state not available
mtu 1480
auto-negotiation Not configured
speed N/A
ipv6-autoconfig Not configured
duplex N/A
monitor-mode Not configured
link-speed Not configured
comments
ipv4-address Not Configured
ipv6-address 2001:470:1f10:117::2/64
ipv6-local-link-address fe80::6153:d346/128
```

```
Statistics:
TX bytes:0 packets:0 errors:0 dropped:0 overruns:0 carrier:0
RX bytes:0 packets:0 errors:0 dropped:0 overruns:0 frame:0
```

In /var/log/messages –

```
Dec 31 19:06:25 2018 LAB01 xpanse[4833]: netis_get_driver_info:Cannot get driver information for sit_6in4_2, Invalid argument
```

```
Dec 31 19:05:44 2018 LAB01 xpanse[4833]: admin localhost p +interface:eth2:6in4:2 t
Dec 31 19:05:44 2018 LAB01 xpanse[4833]: admin localhost p +interface:sit_6in4_2 t
Dec 31 19:05:44 2018 LAB01 xpanse[4833]: admin localhost p +interface:sit_6in4_2:dev eth2
Dec 31 19:05:44 2018 LAB01 xpanse[4833]: admin localhost p +interface:sit_6in4_2:ip6 t
Dec 31 19:05:44 2018 LAB01 xpanse[4833]: admin localhost p
+interface:sit_6in4_2:ip6addr:200104701f1001170000000000000002 t
Dec 31 19:05:44 2018 LAB01 xpanse[4833]: admin localhost p
+interface:sit_6in4_2:ip6addr:200104701f1001170000000000000002:mask 64
Dec 31 19:05:44 2018 LAB01 xpanse[4833]: admin localhost p +interface:sit_6in4_2:local 97.83.211.70
Dec 31 19:05:44 2018 LAB01 xpanse[4833]: admin localhost p +interface:sit_6in4_2:mtu 1480
Dec 31 19:05:44 2018 LAB01 xpanse[4833]: admin localhost p +interface:sit_6in4_2:remote
184.105.253.14
Dec 31 19:05:44 2018 LAB01 xpanse[4833]: admin localhost p +interface:sit_6in4_2:state on
Dec 31 19:05:44 2018 LAB01 xpanse[4833]: admin localhost p +interface:sit_6in4_2:ttl 20
Dec 31 19:05:44 2018 LAB01 xpanse[4833]: admin localhost p +interface:sit_6in4_2:type 6in4
```

Solution:

You will notice that the local address configured during the creation process of the sit interface is not the current external address assigned to your external DHCP connection.

In Gaia, if you have ever assigned an external address and reverted back to DHCP you will see the old address still in the static address area even though it is greyed out. You must remove this old entry or change it to your new external address for the tunnel configuration to be complete.

