Solution Guide

How to Build a Resilient Out-of-Band Network with ZPE Systems Nodegrid and Starlink WAN Connection

With the availability of Starlink, organizations can now build resilient out-of-band networks without the need for traditional POTS lines and PSTN telephony lines.

This document provides a step-by-step guide on how to set up out-of-band connectivity using a router and Starlink. This guide includes images of the Starlink satellite dish, a wiring diagram, and the management interface

Benefits of Using Starlink for Out-of-Band Networks

- Reliable and high-speed internet connectivity
- Low latency
- Wide coverage area
- Easy to set up and manage
- Cost-effective

Requirements

- Starlink Mobile App
- Starlink Satellite Equipment
- ZPE Systems' Nodegrid Device (such as the Hive SR)
- ZPE Systems' Access Point and PoE switch *(optional - used in this guide)*
- ZPE Systems' Temperature Sensor *(optional - used in this guide)*
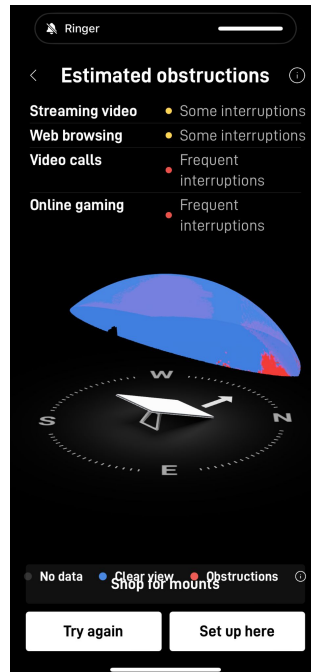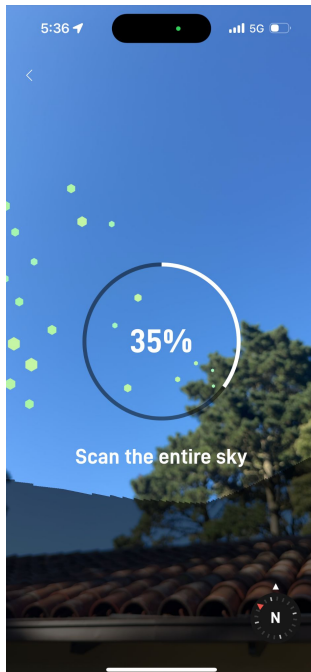- Portable Battery *(optional - used in this guide)*
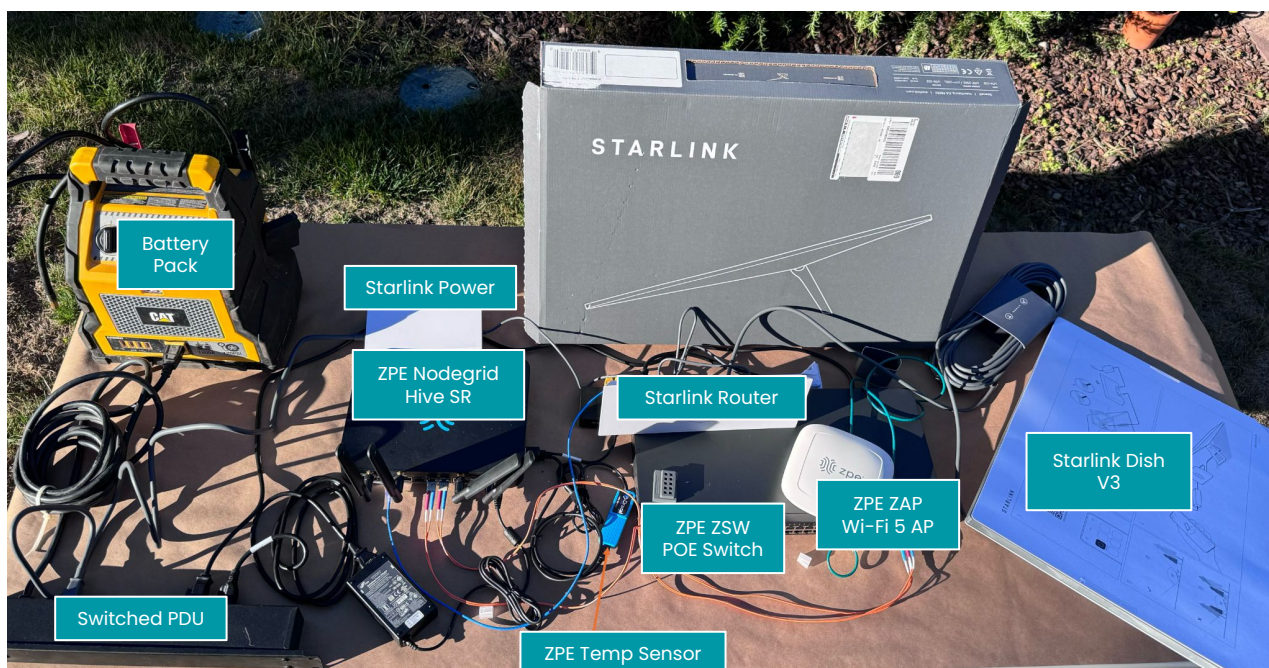
Instructions

1. **Connect the equipment according to this wiring diagram:**
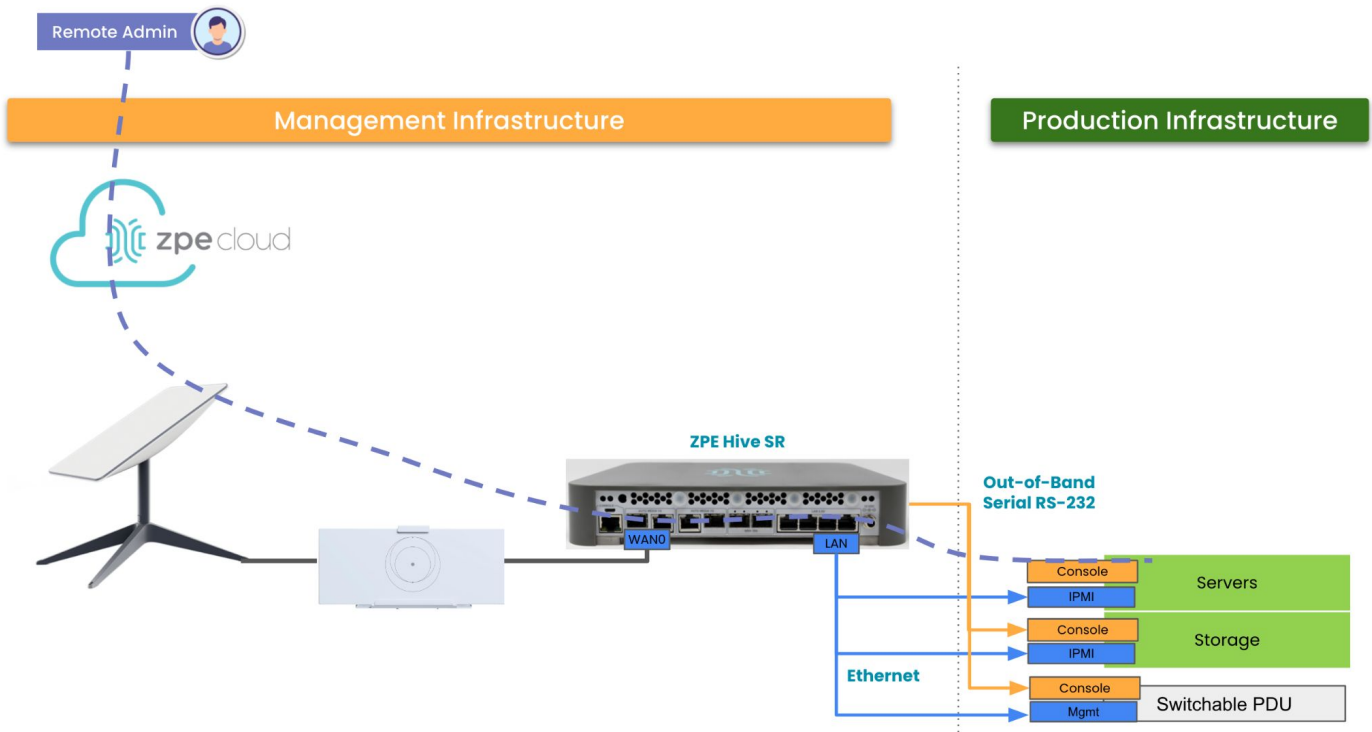
2. **Set up the Starlink satellite dish and router, and test speed and coverage:**

   a. Choose a location with a clear view of the sky.

   b. Use the Starlink app (Android or iOS) to scan the sky and position the dish.

c. Connect the Starlink dish to its router and power supply, and then power it up.

d. [Sign up for a Starlink account and select one of the three data plan options:](#)
    i. $50/month for 50GB plan with Mini Dish
    ii. $120/month for unlimited data without roaming (best for buildings)
    iii. $150/month for unlimited data with roaming

e. Use the Ethernet cable to connect the Starlink router to the ZPE Nodegrid device's WAN port (refer to wiring diagram above).

f. Plug the Starlink power adapter into the router and connect it to a power outlet.

g. The Starlink App will confirm that the dish is set up successfully and will perform a speed and coverage test (see example below).
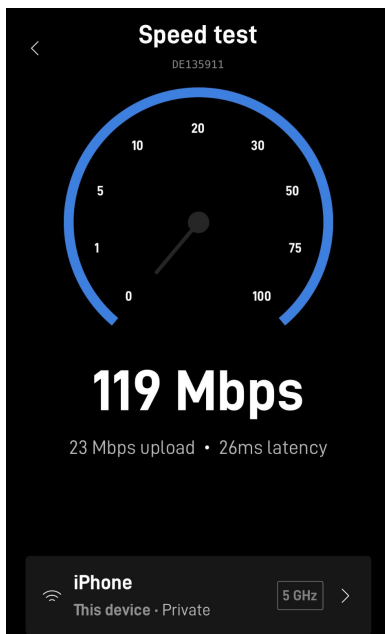
3. Configure the ZPE Hardware

a. The ZPE Nodegrid device ships with Gateway Mode. This configuration works out of the box and requires only minimal configuration to finalize setup.

b. Ensure the Starlink router is plugged into the WAN0 or WAN1 port of the Nodegrid device. The Nodegrid device will automatically pull an IP address from Starlink and update its routing table to use Starlink as a primary or backup WAN link.

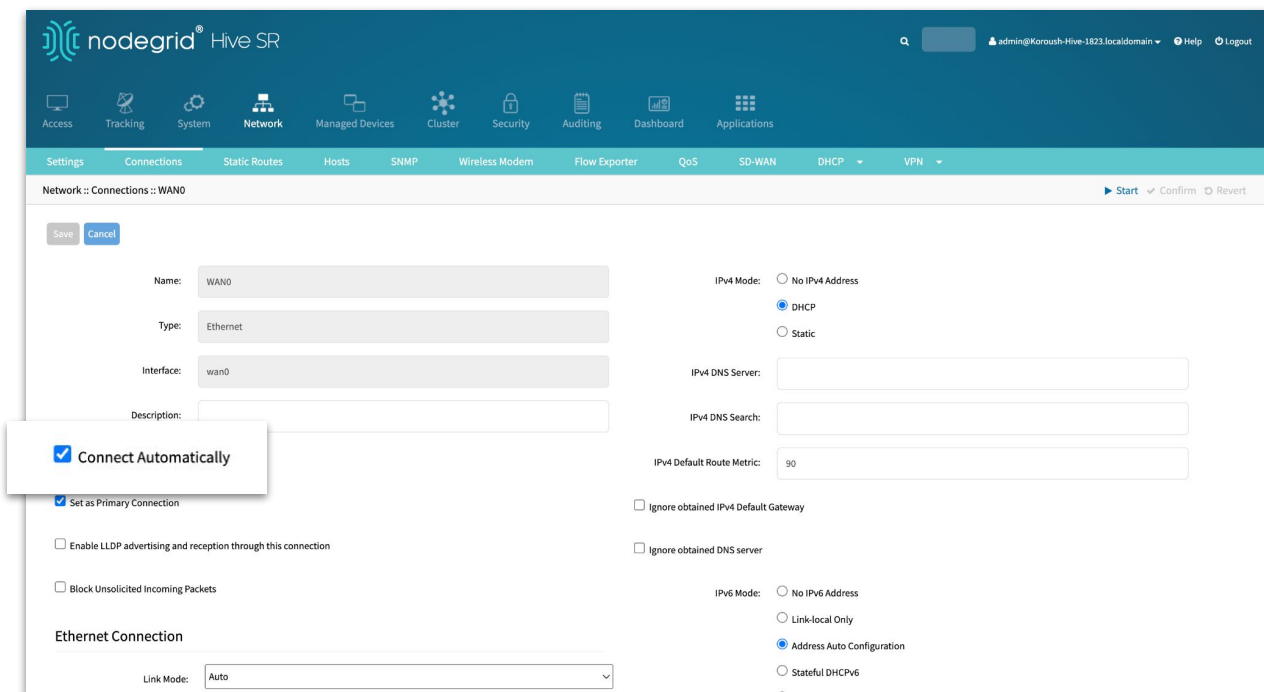c. See the graphic below on Starlink recognizing **hive-1823.**
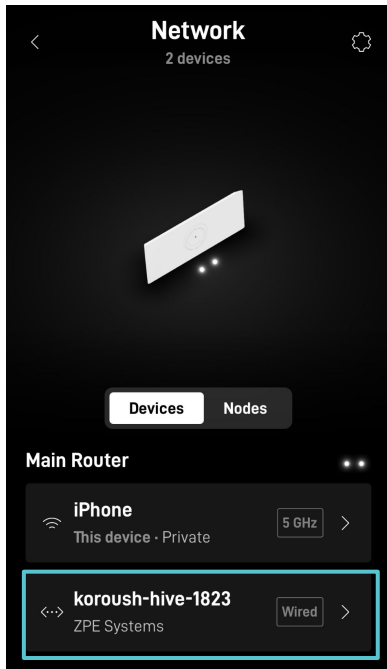
d. See the graphic below on the Nodegrid device getting IP address **192.168.1.62** from the Starlink router on the WAN0 interface.

Note: Nodegrid devices in Gateway Mode require no additional configuration (*order SKU with -GW suffix to receive the product in Gateway Mode*).

e. Nodegrid is configured so WAN0 and WAN1 interfaces connect automatically.
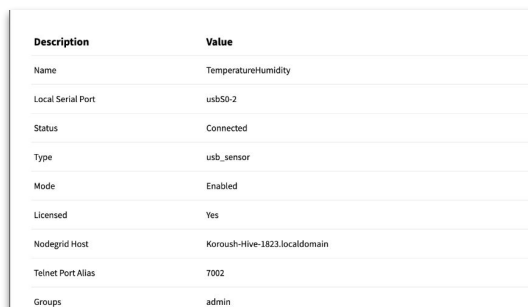

4. Test the Out-of-Band Access

a. Connect the management ports of your target devices to USB-serial and ethernet ports of Hive SR. *Optionally, connect any sensors.* In this example, the ZPE temperature and humidity sensor is connected to show out-of-band access to environmental sensors in a remote location.

b. ZPE Cloud is ZPE's SaaS service. This acts as a hub in the cloud, which all ZPE devices can connect to in an automated, zero-touch fashion. The graphic below shows the ZPE Cloud interface. In the table, the first row shows the Hive SR is connected. Clicking the **'CONNECT'** button will create a secure path to the remote Hive SR, using the Starlink channel and ZPE Cloud as a bridge.

Status	Network Interface	IP Address	Site Name	Groups	Version	Uptime	Revision Tag	Backup Time	Access
● Online	CELLULAR-A	-	-	Operator	v5.10.2 (Jun 30 2023 - 17:32:06)	12 minutes, 11 seconds	r1	-	CONNECT

c. The graphic below shows the temperature and humidity sensor is accessible remotely.

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Test the connectivity, latency, and the quality of the Hive SR's connection to the outside world. This is where the out-of-band satellite connection can be shared for in-band data traffic as well. In this setup, we see the public IP address **98.97.24.224** owned by **SpaceX Services Inc.** is supplied to this Nodegrid Hardware. Nodegrid's built-in Firewall drops all inbound connections.
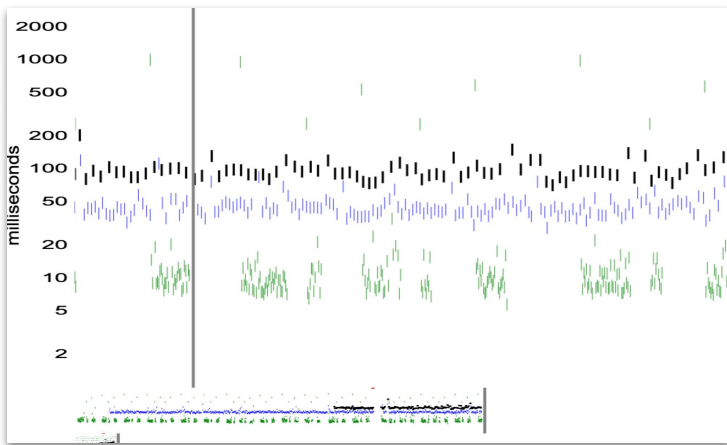

For latency testing, obtain real-time link characteristic measurements (latency, drops, delay to DNS server) using this tool **https://gfblip.appspot.com/** - This is especially useful as you make minor adjustments to the disk and to monitor how the link quality improves or degrades.

Conclusion

By following the steps outlined in this document, you can easily set up a router with Starlink and build a resilient out-of-band network. Starlink provides reliable and high-speed internet connectivity, along with low latency, a wide coverage area, and easy setup and management. This is a very viable replacement for end-of-life POTS telephone systems, providing better performance and coverage.

Please forward any inquiries to info@zpesystems.com.