

5G with Peplink

Whitepaper
Version 2.0
Mar 2022

5G IS UPON US

5G is here and the transition is much faster than that of 3G to 4G. There is great momentum in the adoption and rollout of 5G, with deployments in more than 60 countries, and counting. 5G can open new opportunities to high speeds and low latencies for anything from mission-critical services to enhanced enterprise networks and even IoT.

This whitepaper aims to help Peplink customers understand the 5G network.



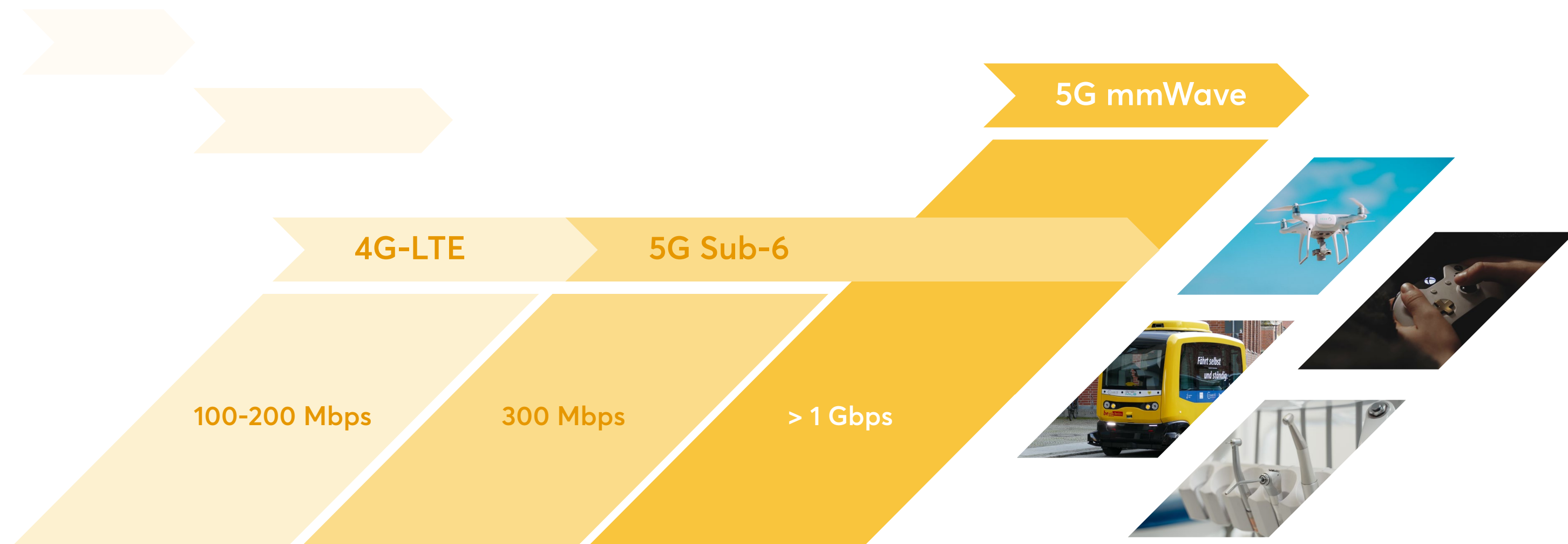
THE PROMISE OF 5G

For now, most providers are rolling out 5G on sub-6 frequencies (800Mhz to 3-5Ghz), as opposed to the highly potential mmWave frequencies (24Ghz to 100Ghz).

5G at the mmWave wavelength promises download speeds over 1Gbps, which is at least 10x faster than the typical 4G-LTE speeds of 100-200Mbps and even faster than many fixed broadband services. This translates to significantly lower latency and theoretically, the latency of 5G could reach an imperceptible 1ms delay compared to the 20-50ms delay typical of 3G and 4G networks. At such a low latency, critical applications that are extremely latency-sensitive, such as autonomous driving, drones, cloud gaming, and robo-surgeries, become highly plausible.

At the opposite end of the wave spectrum, the sub-6 frequencies typically trade speed for reliability. At these frequency ranges, 5G offers less dramatic speed improvements over 4G at similar levels of reliability.

With such a wide operable spectrum, 5G promises something for every app and organization.



LIMITATIONS

To enjoy 5G, supporting devices are required.

At millimeter wavelength, 5G signals display physical properties similar to light. This means 5G operating at mmWave loses signal strength when passing through the air, water vapor, and less dense objects. It partially bounces off transparent objects such as glass, and it is unable to penetrate solid objects such as wood, metal, and concrete. The maximum range of mmWave at 24GHz is around 1km in the open and is much lower when there are objects in the way. Although technologies such as MIMO and multiple antennas help to boost signal reception, signal strength in indoor and urban areas could still become very unpredictable. At the same time, outdoor base stations and indoor small cells need to be densely deployed. This means infrastructure deployments will be costly, time-consuming, and laden with potential legal liabilities over public health concerns.



Glass

Metal and Concrete

Wood

5G WIRELESS SD-WAN WITH PEPLINK | PEPWAVE

Businesses and government agencies are adopting SD-WANs at a rapid pace to replace legacy WANs running on MPLS. An SD-WAN on the mainstream enterprise market typically offer one additional WAN link with broadband, DSL, or mobile to affordably increase the bandwidth of the existing MPLS connection, and to provide a failover backup. This offers substantial cost savings over MPLS for the same amount of network bandwidth and provides some form of an increase in reliability. Other typical features include WAN optimization, application-specific network rulesets, and centralized control of branch networks via the cloud.

With our patented SpeedFusion technology, Peplink goes a step further than the above feature sets. SpeedFusion allows users to combine any number of connections together to form a point-to-point link to achieve what others cannot:

Untethered from fixed-line

Combine the bandwidth of several mobile connections to form an ultra-fast data link. Sustain bandwidth-hungry and latency-sensitive tasks without the need for fixed lines, such as rolling workplaces with full access to multi-cloud and security services, HD video streaming, and clinics.



Unrivalled coverage

SpeedFusion is carrier agnostic and our products are certified with multiple carriers. By combining the coverage network of several mobile carriers, chances of running into a network blindspot are minimized.



Unbreakable connectivity

SpeedFusion's Hot Failover maintains secure tunnels over all the available WAN links to keep the network up and running when a connection drops out. If a WAN link fails, SpeedFusion instantly routes traffic to a working tunnel for uninterrupted VoIP sessions.



5G WIRELESS SD-WAN WITH PEPLINK | PEPWAVE

In the coming years, 5G will enable connectivity to billions of devices outside the reach of any fixed-line infrastructure. Furthermore, enterprises will increasingly move to a fixed + mobile network architecture to take advantage of the extreme bandwidth of 5G. Thus, wireless SD-WANs will become the key technology to power branch networks.

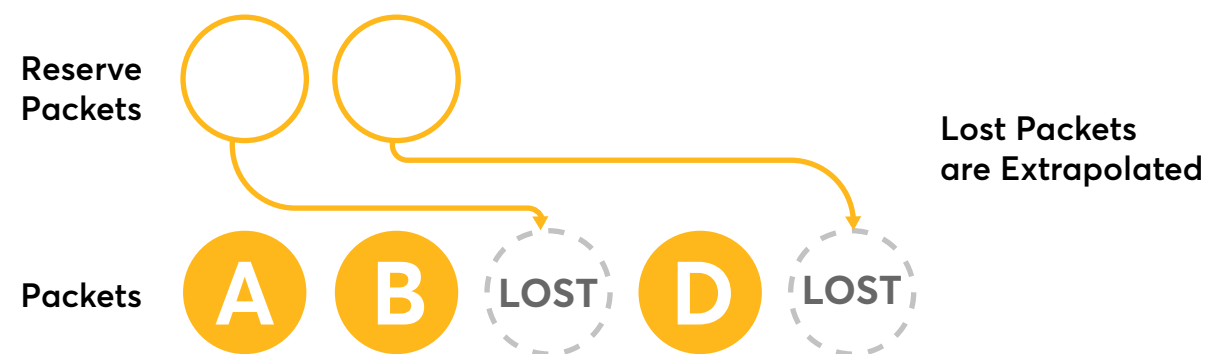
Since its founding in 2006, Peplink has long focused on wireless SD-WAN technologies. Now, we are ready to propel customers into the 5G-era with a range of brand new flagships featuring an innovative modular platform architecture for different use cases:

Connection Reliability vs Consistency

Reliable connections are not necessarily consistent connections. Although a connection may stay up, it can still suffer from significant packet loss. This results in jitters during VoIP and video streaming sessions, which can cause disruptions to important communications with sound loss and distorted video. Peplink has developed technologies to combat the effects of packet loss: WAN Smoothing and Forward Error Correction.

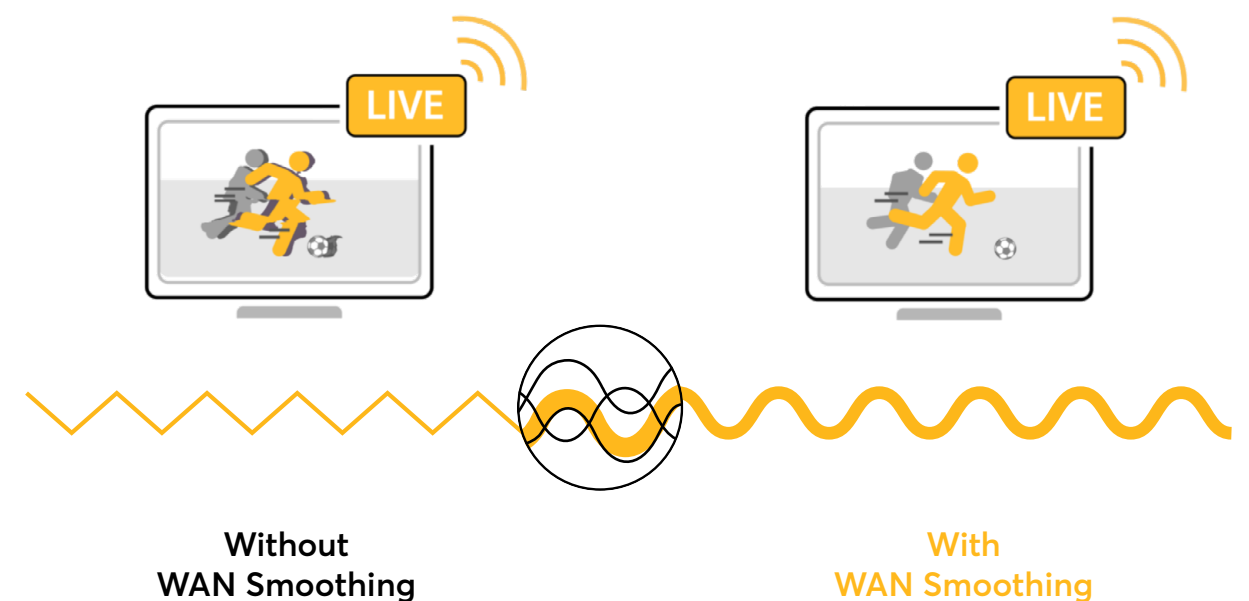
Forward Error Correction (FEC)

This Peplink technology generates reserve packets. When packet loss occurs, FEC uses the information within the reserve packets to extrapolate the lost data. This technology is best suited to one-way video streaming.



WAN Smoothing

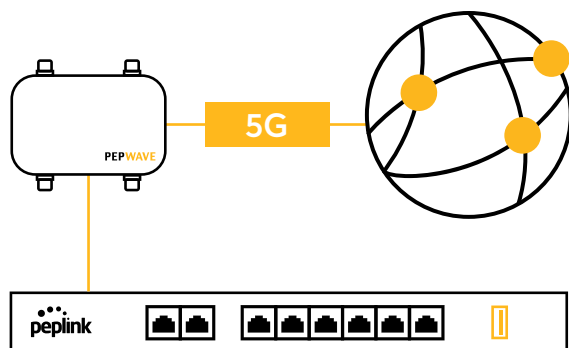
This Peplink technology duplicates packets. When packet loss occurs, the duplicated packets replace the lost packets. This technology is best suited to two-way communications such as VoIP or video conferencing.



5G Upgrade Path

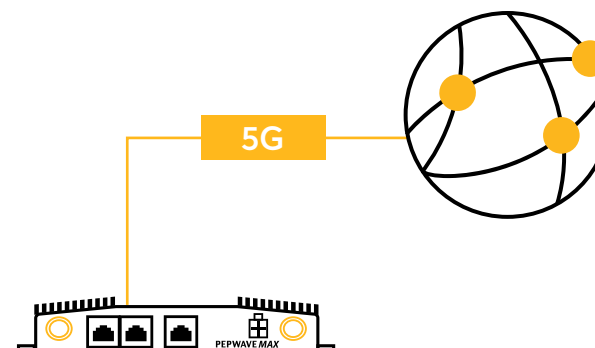
Upgrade Existing Peplink Devices

Upgrade your existing Peplink devices with a MAX Adapter 5G. By simply connecting this state-of-the-art cellular modem to the USB WAN port of your compatible device, you can enjoy an additional 5G WAN.



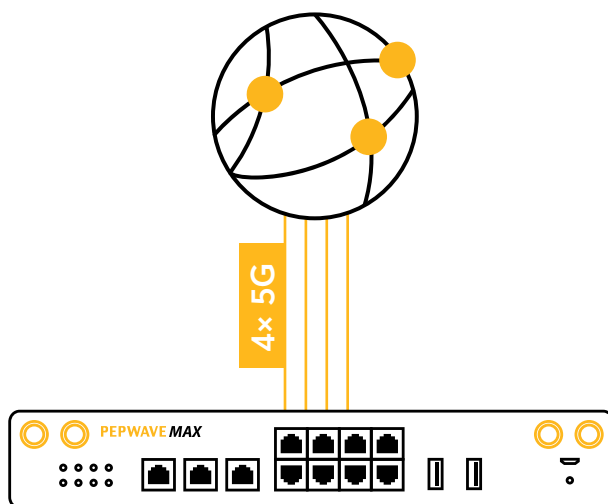
Single-Cellular Routers

With a 5G cellular modem and a 2.5Gbps WAN port, the MAX BR1 Pro 5G can either secure you with reliable wireless connectivity on the move, or provide 5G as a backup for your wired network.



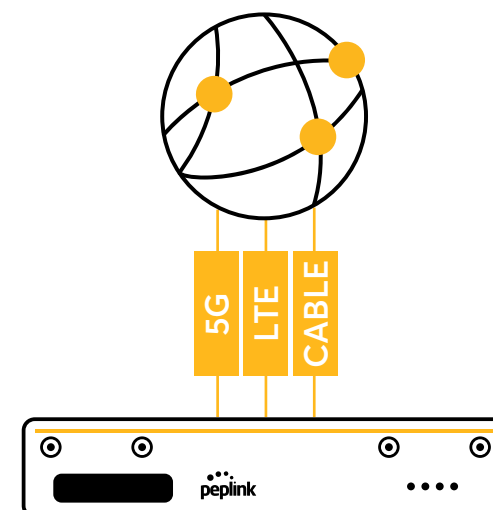
Multi-Cellular Routers

Stay connected by combining up to four 5G cellular connections. The compact form of the MBX 5G allows it to be deployed in a wide range of situations, such as vehicles, vessels and temporary sites.



5G for Branch Connectivity

With an Ethernet WAN port, an LTE modem, and a 5G modem, the Balance 310 5G allows connections of different kinds to work simultaneously. Together with Traffic Steering technology, it helps you balance your enterprise's network traffic.



Our 5G Portfolio: Enterprise



MAX Adapter

Peplink's state-of-the-art cellular modem offers 5G connectivity. Housed in a portable and industrial-strength enclosure to offer continuous high-traffic and low latency operation for any demanding needs.



Rapid Upgrade for Peplink Devices

This capable device provides a rapidly deployable upgrade for any Peplink device supporting a USB WAN port.



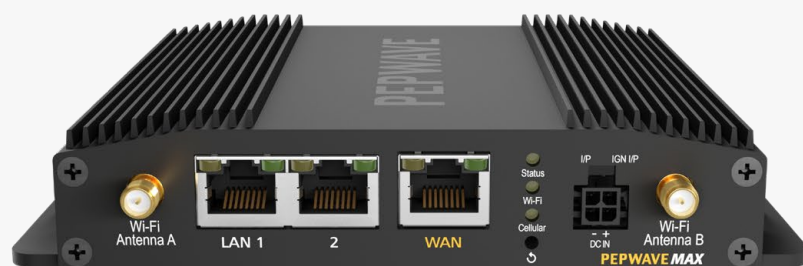
Integrate a 5G Failover to Your Setup

Add a 5G failover to your existing setup, or even upgrade an LTE Peplink device to a 5G device. There are many options available.

Our 5G Portfolio: 5G Failover

BR1 Pro 5G

The top-selling BR1 comes back in an upgraded iteration, this time with 5G. Whether you need massive bandwidth by bonding your connections, or a seamless failover, the BR1 Pro 5G is sure to impress.



Mobile 5G

Enjoy blazing-fast 5G speeds via global bands, Wi-Fi 6 MU-MIMO, Ignition sensing capabilities, and many more.

Quick Setup for High Bandwidth Demands

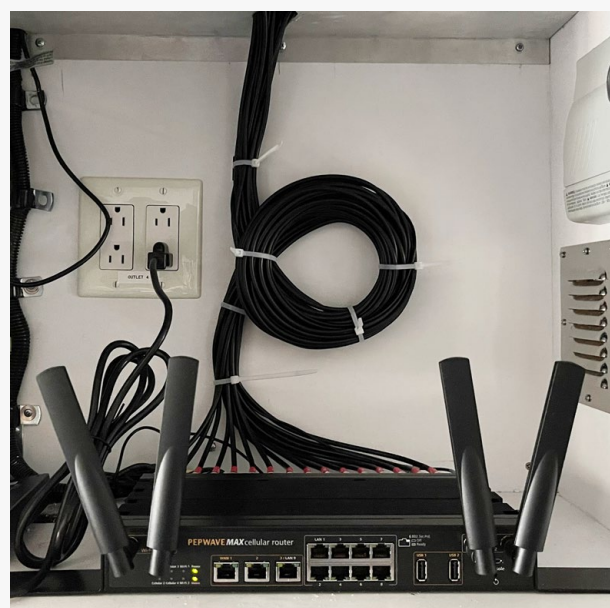
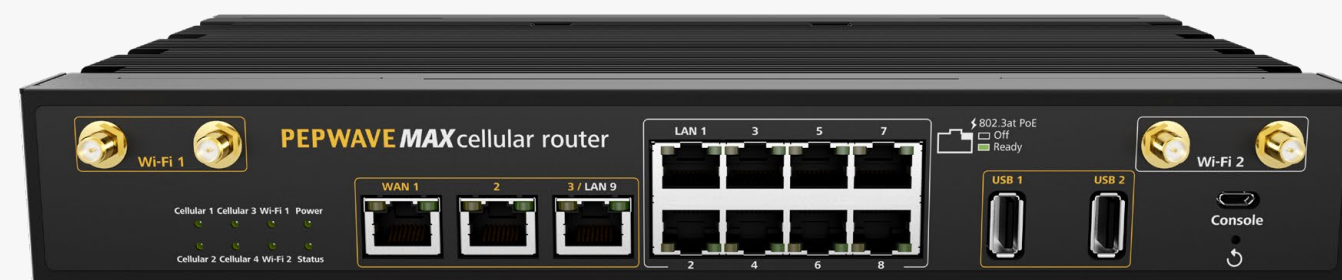
The BR1 Pro 5G offers a 5G experience that's easy to set up for construction sites, allowing you to connect to multiple devices simultaneously without interference.



Our 5G Portfolio: Mission-Critical

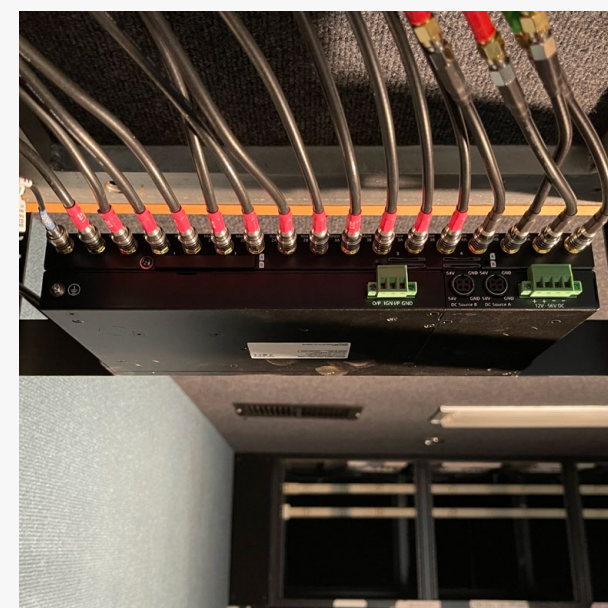
MBX 5G

Eliminate spotty coverage for mission-critical applications, with the MBX 5G. Available as a quad cellular device supporting four cellular providers simultaneously with room for 4 more redundant SIMS, the MBX 5G can provide connectivity like no other.



SpeedFusion Bandwidth Bonding

The MBX 5G is perfect for times where high bandwidth and low latency is required. Combine the bandwidth of 4 different cellular providers into an unbreakable high-speed SD-WAN connection.



Give the Best for What You Need

Don't let poor signal affect your mission critical tasks. FusionSIM offers remote provisioning of SIM profiles to your devices from one simple management portal.

Our 5G Portfolio: Office Failover



Balance 310 5G

With cellular WANs (5G and LTE) and Ethernet WAN support, this device can handle more than the requirements of your office environment.

Balance 310 Fiber 5G

Effectively failover to 5G from your main Fiber line, to optimize any connectivity needs for your office.



Balance 310X 5G

Combine 2 Ethernet WANs alongside 5G, or use them separately as a failover for any SpeedFusion requirements to meet your needs.

Our 5G Portfolio: Balance 310 Family

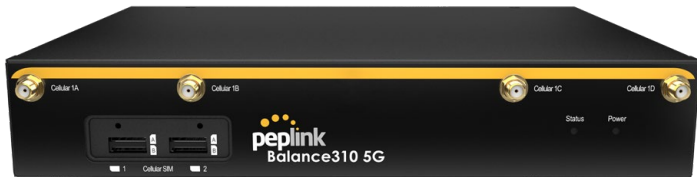
Versatile branch routers with multi-WAN capabilities to be used according to your office needs:

Balance 310X 5G



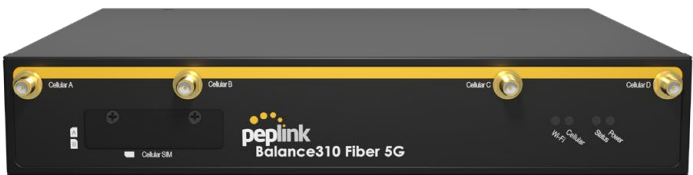
Handle two ethernet WANs from different ISPs.

Balance 310 5G



For 5G network support that requires 4G LTE for backup.

Balance 310 Fiber 5G



Network resilience by supporting Fiber, and failing over to 5G when needed.

Ethernet WAN Port	2×	1×	1×
SFP WAN Port	-	-	1×
5G WAN	-	1×	1×
4G WAN	-	1×	-
PrimeCare	✗	✓	✓
Wi-Fi AP	✗	✗	✓
Ideal Scenario	2 Ethernet Cables from different providers	5G network that requires 4G LTE for backup	SFP WAN for accessing gigabit fiber optic internet