

# Anybus Bolt II

## An Industrial Wireless Device Review



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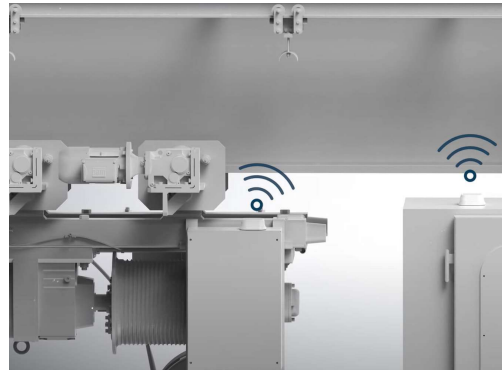
## Contents

|                                                     |    |
|-----------------------------------------------------|----|
| What is the Bolt II? .....                          | 3  |
| Operational Frequencies.....                        | 5  |
| Operational Modes .....                             | 6  |
| Security .....                                      | 8  |
| Throughput Testing .....                            | 9  |
| Access Point Mode.....                              | 10 |
| Cable Replacement Mode (transparent bridging) ..... | 12 |
| Client NAT Mode.....                                | 13 |
| Overall Throughput Analysis.....                    | 15 |
| Final Thoughts.....                                 | 17 |
| Appendix.....                                       | 19 |
| AP Mode Throughput Results .....                    | 19 |
| Cable Replacement Throughput Results .....          | 20 |
| NAT Bridge Throughput Results.....                  | 21 |

## What is the Bolt II?

The Anybus Wireless Bolt II is a compact industrial wireless device designed to add Wi-Fi connectivity to machines, control cabinets and other equipment with a wired Ethernet connection. It combines the radio, internal dual-band antenna and Ethernet interface in one rugged enclosure. Depending on how it is configured, the Bolt II can provide wireless access to a machine, connect wired equipment to an existing Wi-Fi network, or replace an Ethernet cable between two locations.

The Bolt II is designed to mount directly through the top of a machine or control cabinet using an M50 mounting hole. The antenna portion remains outside the enclosure, where it has a clear path for wireless communication, while the Ethernet and power connections remain protected inside. This arrangement gives the installation a clean, integrated appearance without requiring an external antenna or antenna cable.



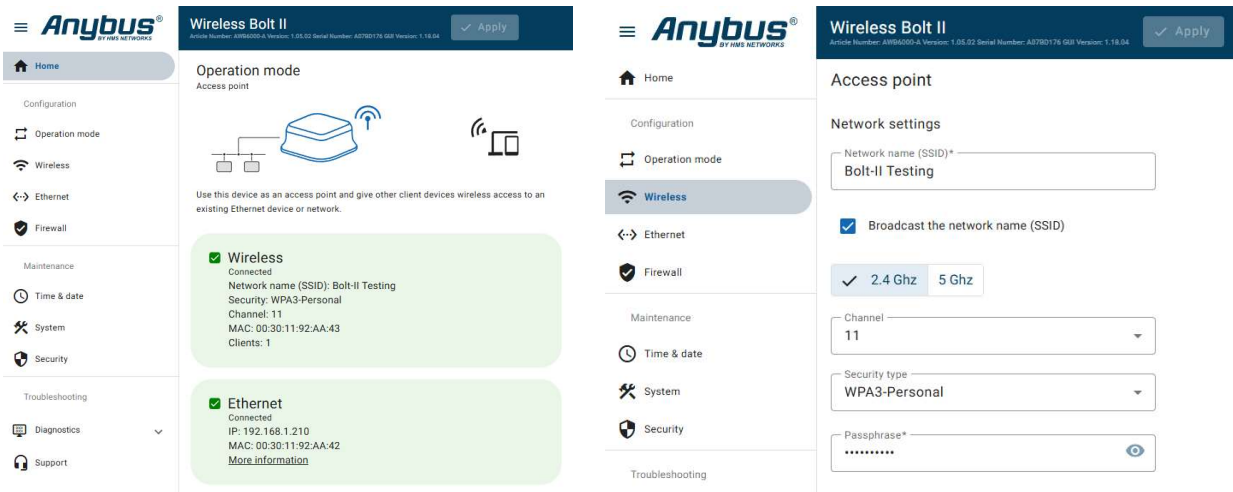
Power can be supplied through a conventional 12 to 24 volt DC connection or through Power over Ethernet (802.3af or 802.3at) via a PoE switch or a suitable PoE injector. Typical power consumption is around 1.45 W with a maximum consumption of 2.7 W.

Common uses include giving a technician wireless access to a PLC or HMI, connecting a mobile machine or wired device to an existing wireless network, and creating a wireless link between two cabinets or production areas. These options make the Bolt II useful for maintenance access, mobile equipment and situations where installing or maintaining a physical Ethernet cable would be difficult.

The Bolt II uses a clean, browser-based interface that is straightforward to navigate. Its layout is simple and uncluttered, with the main sections arranged in a menu along the left

# The Industrial Wi-Fi Shop

side of the screen and the selected page displayed in the larger workspace to the right. The interface does not bury routine settings under several layers of menus, so it is easy to move between wireless, Ethernet and system configuration. A status overview on the Home page provides a quick look at the selected operating mode, wireless connection, signal strength and Ethernet connection.



Initial configuration follows a logical path. The Operation Mode page is where the Bolt II is configured as an access point, wireless client or one side of a cable-replacement connection. The Wireless page then presents the settings appropriate for that mode, including the network name, frequency band, channel, security type and passphrase. When Client mode is selected, this section also provides the choice between MAC Clone and NAT forwarding. The Ethernet page handles the Bolt's IP address, subnet mask, gateway, DNS and DHCP settings.

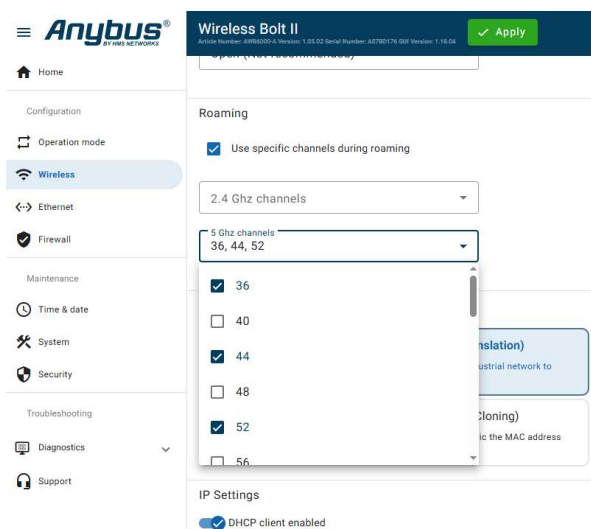
The remaining pages cover maintenance and troubleshooting. Time and Date controls the internal clock and network time synchronization, while System contains configuration-file handling, firmware updates, reboot and factory-reset functions. Security manages certificates, and Diagnostics provides connection status and event information that can help identify problems. A Support page contains product information and tools for creating a support package. Configuration changes are not activated immediately; the user reviews the settings and selects Apply in the interface header, providing a clear final step before the Bolt restarts or places the new configuration into service.

## Operational Frequencies

The Bolt II is a Wi-Fi 5 device that supports both the 2.4 GHz and 5 GHz frequency bands. The 2.4 GHz band generally provides better range and penetration through obstacles, while 5 GHz offers more available channels and typically performs better when higher throughput is needed. The Bolt II cannot operate on both bands at the same time. It contains one dual-band Wi-Fi radio rather than two independent radios, so the user must select either 2.4 GHz or 5 GHz for the wireless connection.

The Bolt II actually supports two spatial streams, not one. Its certified internal radio module is a 2x2 MIMO device, meaning it can use two transmit and two receive paths. Even with that capability, HMS rates the finished Bolt II for a maximum net data throughput of about 70 Mbps. That is modest compared with modern enterprise Wi-Fi equipment, but it is appropriate for the product's intended role. Most industrial applications exchange relatively small amounts of PLC, HMI, diagnostic or machine data and do not need hundreds of megabits per second.

When the Bolt II is used as a client on mobile equipment, it normally scans the available Wi-Fi channels while looking for an access point. By default, it can scan all supported channels, but the interface allows the user to limit that search to specific 2.4 GHz or 5 GHz channels. If the channels used by the wireless network are already known, restricting the scan list prevents the Bolt II from spending time checking channels where no access point will be found.

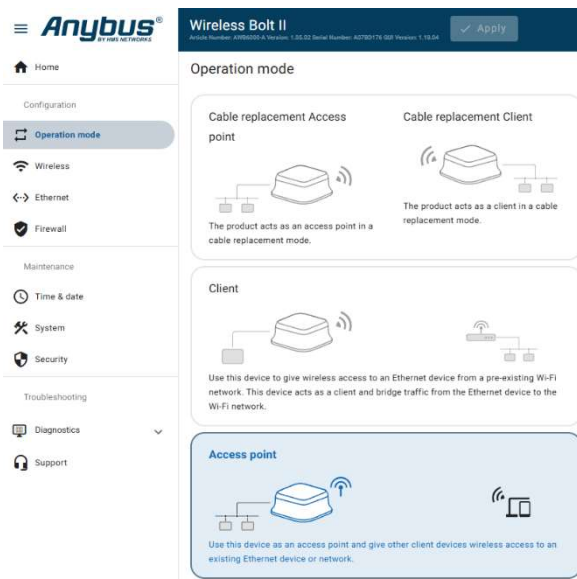


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This channel-selection feature can help reduce roaming and reconnection times on AGVs, mobile machines and other equipment that moves between access points. It does not eliminate the time required to roam, but it makes the search process more focused. For example, if every access point along a production route uses channels 36, 44 and 149, the Bolt II can be configured to scan only those channels instead of searching the entire 5 GHz band.

## Operational Modes

The Bolt II has three main operating modes: Access Point, Client and Cable Replacement. These modes use the same hardware but change how the radio joins the wireless network and forwards Ethernet traffic. Access Point mode creates a Wi-Fi network, Client mode connects wired equipment to an existing Wi-Fi network, and Cable Replacement mode creates a transparent wireless bridge between two wired network locations.



In Access Point mode, the Bolt II connects to a wired Ethernet network and provides wireless access to that network. Wi-Fi devices connect directly to the Bolt using its network name and security credentials. A common application is mounting the Bolt on a control cabinet so a technician can access a PLC, HMI or other automation equipment from a laptop or tablet. It can also provide wireless connectivity for mobile equipment located within its coverage area. The Bolt can supply addresses from its internal DHCP server, although that function should be disabled when another DHCP server already exists on the network.



In Client mode, the Bolt joins an existing wireless network as a Wi-Fi client and provides connectivity to equipment connected to its Ethernet port. Client mode has two forwarding options: MAC Clone and NAT. MAC Clone presents one connected Ethernet device to the wireless network by using that device's MAC address. This is useful when a single PLC, controller or other Layer 2-dependent device needs to connect through a standard wireless access point without changing its network configuration. The limitation is that only the cloned device is forwarded; traffic from additional devices behind the Bolt is ignored.

The second Client forwarding option is NAT, which is intended for multiple Ethernet devices connected through a switch. NAT places those devices on a separate wired subnet and represents them to the wireless network through the Bolt's Wi-Fi address. This works well for a machine containing several controllers, drives, cameras or other IP devices that primarily initiate connections to the plant network. Devices on the main network can reach equipment behind the Bolt through configured port-forwarding rules. Because NAT separates the two networks, it does not provide transparent Layer 2 communication and will not pass protocols that depend on broadcasts or other Layer 2 traffic.

Cable Replacement mode uses two Bolt II radios to create a transparent wireless connection between two Ethernet network locations. One unit is configured as the Cable Replacement Access Point, while the second is configured as the Cable Replacement Client. Together they use WDS bridging to carry Layer 2 traffic, allowing multiple devices and industrial Ethernet protocols to pass across the link while remaining on the same IP subnet. Common examples include connecting two control cabinets without running a cable, linking a PLC on a moving machine to a stationary network, or replacing a damaged or impractical Ethernet run. Unlike ordinary Client mode, both ends of this connection are managed as a matched Bolt II pair.

It is important to understand that Cable Replacement mode is considered to be a point-to-point connection. This means that there can be only one access point and one client in this mode and both must be Bolt II devices in order for fully transparent bridging to function.

## Security

The Bolt II supports modern Wi-Fi security even though it is a Wi-Fi 5 device. Wi-Fi generation and security generation are separate, so a Wi-Fi 5 radio can still use WPA3. The available security options depend on how the Bolt is being used.

In normal Access Point mode, the choices are an open network, WPA2-Personal and WPA3-Personal. An open network has no wireless encryption and should generally be reserved for temporary testing. WPA2-Personal and WPA3-Personal use a shared passphrase, making them the most practical choices for technicians, HMIs and other devices connecting directly to the Bolt.

Client mode offers the widest range of security options because the Bolt II may need to join an existing enterprise wireless network. It supports WPA2-Personal and WPA3-Personal, along with WPA2-Enterprise and WPA3-Enterprise. Enterprise authentication can use a username and password through PEAP-MSCHAPv2, or certificate-based TLS on current firmware. This allows the Bolt II to authenticate through a RADIUS backed industrial or enterprise wireless network instead of relying on one shared password for every device. When certificate-based authentication is used, the required CA certificate, client certificate and private key must be loaded into the device.

Cable Replacement mode is more restricted. The WDS access point and WDS client are locked to WPA2-Personal and must be configured with the same passphrase. WPA3 and Enterprise authentication are not offered in this mode. This appears to be a limitation of the device's WDS cable replacement implementation rather than a general limitation of the Wi-Fi radio. HMS designed this mode around a controlled, matched connection between Bolt II units, with WPA2-Personal providing encryption without adding the complexity of RADIUS or certificate management.

The Bolt II does not support WEP or the original WPA/WPA1 security standard. Those older methods have known weaknesses and are no longer appropriate for the current industrial wireless production environment. It also does not offer support for every possible 802.1X method, such as EAP-TTLS, EAP-FAST, EAP-SIM or EAP-AKA. Enterprise Wi-Fi is not one universal login type, both the network and client must support the same EAP method. If an existing network uses an authentication method outside the radios available selections, the Bolt II will not be able to join it without changing the network policy or providing a compatible SSID.

Security also applies to the management interface. The Bolt's configuration pages are accessed through HTTPS, and the unit ships with a self-signed web certificate. A browser may display a certificate warning until a trusted certificate is installed. The default administrative username is admin while the default password is physically printed on the device itself. The interface requires the password to be changed during the first login.

## Throughput Testing

All throughput testing was performed in a controlled lab environment rather than an active industrial production facility. The results should therefore be viewed as an example of the performance possible under relatively favorable conditions, not as guaranteed speeds for every installation. Actual throughput will vary depending on distance, interference, channel congestion, physical obstructions, device placement, reflections from metal surfaces and other conditions unique to the operating environment. Testing at the intended installation site is the best way to determine how the Bolt II will perform in a specific application.

For earlier throughput testing, I used iPerf from the command line as well as JPerf, a graphical front end that makes iPerf settings and results easier to work with. Both tools can produce useful TCP and UDP measurements, but they require computers to be configured as the client and server, and the quality of the results can be affected by those computers, their network adapters and other processes running at the same time. Collecting, organizing and presenting the results also requires more manual work.



***NetAlly CyberScope Air, LinkRunner AT 4000 and Test Accessory***

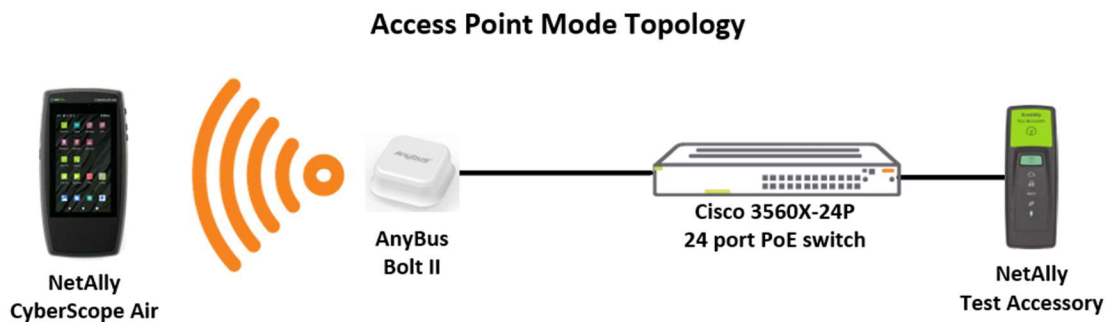
For the Bolt II testing, I used a NetAlly CyberScope Air, a LinkRunner AT 4000 and a NetAlly Test Accessory. The CyberScope Air handles testing through the wireless interface, while the LinkRunner AT 4000 tests through a wired Ethernet connection behind the Bolt. The Test

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Accessory provides a dedicated iPerf3 server at the other end of the connection, removing the need to configure and maintain a separate computer as the test server.

This combination gives me clearer, more repeatable results and presents the upload and download measurements in an easy-to-read format. The results can also be uploaded to NetAlly's Link-Live service, where they are saved, organized and available as documentation after the testing is complete.

## Access Point Mode



For this test, the Bolt II was configured as a wireless access point and connected to a Cisco 3560X-24P PoE switch. The NetAlly Test Accessory was connected to the same switch and served as the iPerf test endpoint. A NetAlly CyberScope Air connected directly to the Bolt II over Wi-Fi and generated the test traffic. This created a simple path consisting of one wireless connection through the Bolt II, followed by a wired connection through the Cisco switch to the Test Accessory.

Each test measured TCP throughput for one minute in each direction. The upload portion measured traffic traveling from the CyberScope Air through the Bolt II to the Test Accessory. The download portion measured traffic returning from the Test Accessory through the Bolt II to the CyberScope Air. Three tests were completed on 2.4 GHz and another three were completed on 5 GHz.

## Bolt II Access Point Mode Throughput Results

TCP throughput measured in Mbps

| Frequency      | Test           | Upload Minimum | Upload Maximum | Upload Average | Download Minimum | Download Maximum | Download Average |
|----------------|----------------|----------------|----------------|----------------|------------------|------------------|------------------|
| 2.4 GHz        | 1              | 43.0           | 70.2           | 54.9           | 44.0             | 60.8             | 53.3             |
| 2.4 GHz        | 2              | 43.0           | 65.0           | 54.0           | 31.4             | 55.6             | 47.5             |
| 2.4 GHz        | 3              | 36.7           | 65.0           | 51.4           | 34.6             | 55.5             | 45.2             |
| <b>2.4 GHz</b> | <b>Average</b> | —              | —              | <b>53.4</b>    | —                | —                | <b>48.7</b>      |
| 5 GHz          | 1              | 26.2           | 69.3           | 55.5           | 15.7             | 61.9             | 47.6             |
| 5 GHz          | 2              | 9.4            | 71.3           | 46.6           | 52.4             | 65.0             | 59.6             |
| 5 GHz          | 3              | 41.9           | 73.4           | 56.3           | 19.9             | 61.9             | 51.4             |
| <b>5 GHz</b>   | <b>Average</b> | —              | —              | <b>52.8</b>    | —                | —                | <b>52.9</b>      |

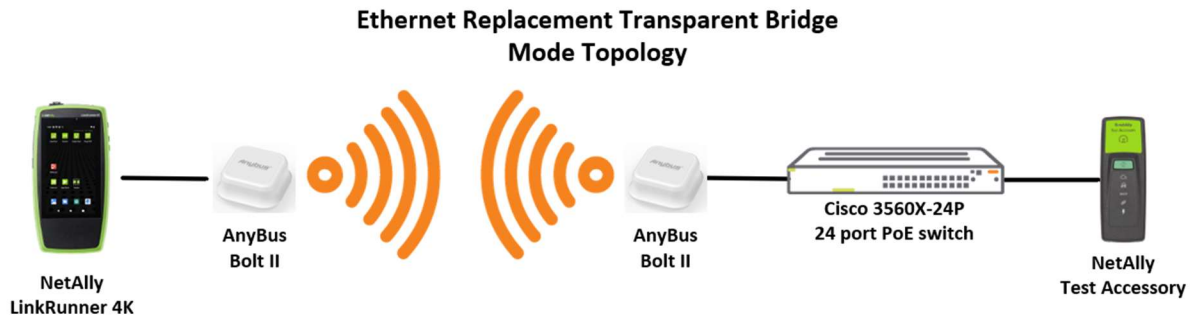
Source: NetAlly CyberScope Air iPerf tests; three one-minute tests per band.

The 2.4 GHz tests produced an average upload speed of 53.4 Mbps and an average download speed of 48.7 Mbps. Upload performance was fairly consistent, with the three test averages falling between 51.4 and 54.9 Mbps. Download performance varied more, falling from 53.3 Mbps in the first test to 45.2 Mbps in the third. Even with that variation, the 2.4 GHz connection maintained useful throughput throughout all three tests without any severe interruption.

The 5 GHz tests produced an average upload speed of 52.8 Mbps and an average download speed of 52.9 Mbps. Overall throughput was almost perfectly balanced between directions, but the individual tests were less consistent. The second upload test averaged only 46.6 Mbps and briefly dropped to 9.4 Mbps, while its download test was the strongest result of the entire group at 59.6 Mbps. The first and third download tests also experienced short drops into the 15-to-20 Mbps range.

Neither frequency produced a major overall speed advantage in this lab test. Both normally delivered between 45 and 60 Mbps, which is close to the practical throughput range expected from the Bolt II. The 2.4 GHz results were somewhat more predictable from test to test, while 5 GHz reached the highest speeds but also produced the largest short-term drops.

## Cable Replacement Mode (transparent bridging)



For this test, the two Bolt II radios were configured in Ethernet Cable Replacement mode to form a transparent wireless bridge. The NetAlly LinkRunner 4K was connected by Ethernet to the client-side Bolt II. Traffic crossed the wireless link to the second Bolt II, which was connected to a Cisco 3560X-24P switch. The NetAlly Test Accessory was connected to the same switch and acted as the remote iPerf endpoint.

From the perspective of the LinkRunner and Test Accessory, the pair of Bolt II radios replaced the Ethernet cable between them. The tests were run separately on 2.4 GHz and 5 GHz, with four 30-second upload and download tests performed on each band.

### Bolt II Cable Replacement Mode Throughput Results

TCP throughput measured in Mbps

| Frequency      | Test           | Upload Minimum | Upload Maximum | Upload Average | Download Minimum | Download Maximum | Download Average |
|----------------|----------------|----------------|----------------|----------------|------------------|------------------|------------------|
| 2.4 GHz        | 1              | 33.6           | 62.9           | 45.8           | 34.6             | 56.6             | 47.7             |
| 2.4 GHz        | 2              | 34.6           | 60.8           | 47.4           | 45.0             | 55.6             | 52.0             |
| 2.4 GHz        | 3              | 34.6           | 57.7           | 47.1           | 46.1             | 54.5             | 50.8             |
| 2.4 GHz        | 4              | 17.8           | 54.6           | 44.1           | 45.0             | 55.6             | 50.2             |
| <b>2.4 GHz</b> | <b>Average</b> | —              | —              | <b>46.1</b>    | —                | —                | <b>50.2</b>      |
| 5 GHz          | 1              | 16.8           | 53.5           | 38.0           | 50.3             | 57.7             | 54.7             |
| 5 GHz          | 2              | 38.8           | 60.8           | 49.6           | 47.1             | 58.7             | 54.8             |
| 5 GHz          | 3              | 43.0           | 56.6           | 50.2           | 48.2             | 57.7             | 55.2             |
| 5 GHz          | 4              | 43.0           | 56.6           | 50.2           | 51.3             | 57.7             | 55.7             |
| <b>5 GHz</b>   | <b>Average</b> | —              | —              | <b>47.0</b>    | —                | —                | <b>55.1</b>      |

Source: NetAlly LinkRunner 4K iPerf tests; four 30-second tests per band.

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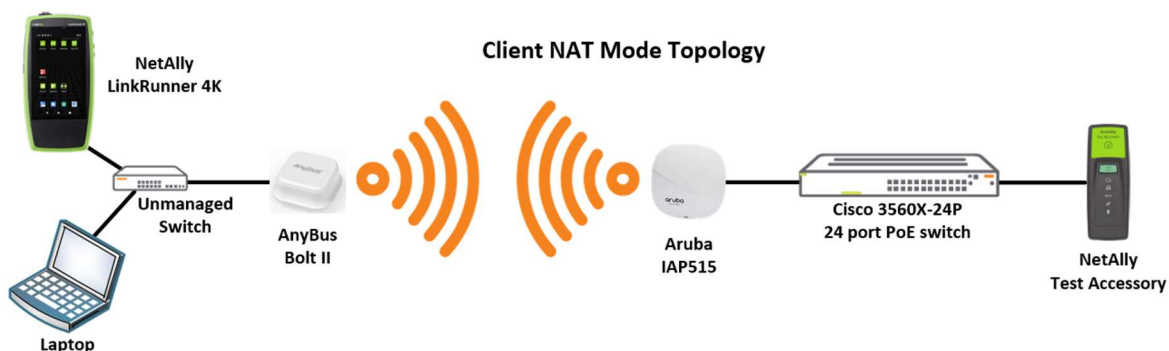
On 2.4 GHz, average upload throughput remained between 44.1 and 47.4 Mbps, producing an overall average of 46.1 Mbps. These test averages were reasonably consistent, although the instantaneous results were less steady. Upload speeds briefly fell to 17.8 Mbps during the fourth test, and the graphs show several smaller fluctuations. Download performance was better, averaging 50.2 Mbps across the four tests. Three of the tests remained close to 50 Mbps, while the first test was slightly lower and showed more variation.

The 5 GHz results produced an overall upload average of 47.0 Mbps, only slightly higher than the 2.4 GHz result. The first upload test was an outlier, averaging 38.0 Mbps and falling as low as 16.8 Mbps. After that initial test, performance settled considerably with the remaining three uploads averaged 49.6, 50.2, and 50.2 Mbps. This suggests the 5 GHz link was capable of stable performance near 50 Mbps once the connection had settled.

Download performance was where 5 GHz had the clearest advantage. Its four tests averaged between 54.7 and 55.7 Mbps, with a combined average of 55.1 Mbps. That is about 4.9 Mbps faster than the 2.4 GHz download average, and the narrow one-megabit spread between the individual test averages shows excellent repeatability. The download graphs (see Appendix) were also noticeably flatter, without the larger changes seen during some of the 2.4 GHz testing.

Overall, both bands delivered usable and reasonably repeatable results through the transparent bridge. The 2.4 GHz band performed well, particularly after looking past a few short drops. However, 5 GHz offered the stronger result, especially for download traffic. Its upload performance stabilized after the first run, and its download throughput was both faster and considerably more consistent.

## Client NAT Mode



For this test, the Bolt II was configured as a wireless client using NAT. The production network used the 192.168.0.0/23 subnet, while the equipment behind the Bolt was placed on the separate 192.168.10.0/24 subnet. A laptop and the NetAlly LinkRunner 4K were connected to an unmanaged switch on the private side of the Bolt. This allowed multiple wired devices to share the Bolt's wireless connection while remaining on their own local subnet.

The Bolt connected wirelessly to an Aruba IAP-515 access point. From there, traffic traveled through a Cisco 3560X-24P switch to the NetAlly Test Accessory at 192.168.0.80, which served as the iPerf endpoint. As traffic crossed the Bolt, NAT translated connections from the private 192.168.10.0/24 network to the production network. Devices on the production network therefore saw the Bolt's translated wireless-side address rather than the individual addresses of the devices behind it.

## Bolt II Client NAT Mode Throughput Results

TCP throughput measured in Mbps

| Frequency      | Test           | Upload Minimum | Upload Maximum | Upload Average | Download Minimum | Download Maximum | Download Average |
|----------------|----------------|----------------|----------------|----------------|------------------|------------------|------------------|
| 2.4 GHz        | 1              | 33.6           | 49.3           | 41.2           | 37.7             | 47.2             | 43.3             |
| 2.4 GHz        | 2              | 33.5           | 55.6           | 41.8           | 38.8             | 48.2             | 44.3             |
| 2.4 GHz        | 3              | 32.5           | 55.5           | 42.0           | 0.0              | 47.2             | 38.4             |
| 2.4 GHz        | 4              | 33.6           | 49.2           | 42.2           | 40.0             | 47.2             | 44.9             |
| <b>2.4 GHz</b> | <b>Average</b> | —              | —              | <b>41.8</b>    | —                | —                | <b>42.7</b>      |
| 5 GHz          | 1              | 42.9           | 53.5           | 46.9           | 39.8             | 52.5             | 47.0             |
| 5 GHz          | 2              | 34.6           | 53.5           | 46.9           | 40.9             | 51.4             | 46.8             |
| 5 GHz          | 3              | 42.9           | 53.4           | 46.9           | 39.8             | 50.3             | 45.8             |
| 5 GHz          | 4              | 34.6           | 53.5           | 46.9           | 36.7             | 50.3             | 45.8             |
| <b>5 GHz</b>   | <b>Average</b> | —              | —              | <b>46.9</b>    | —                | —                | <b>46.4</b>      |

Source: NetAlly LinkRunner 4K iPerf tests; four 30-second tests per band.

On 2.4 GHz, upload throughput was very repeatable. The four tests averaged between 41.2 and 42.2 Mbps, resulting in a combined average of 41.8 Mbps. Although the graphs show normal moment-to-moment movement, there were no major upload interruptions. The narrow one-megabit difference between the four test averages indicates that the NAT connection delivered predictable upload performance on this band.



The 2.4 GHz download results were less consistent. Three tests averaged between 43.3 and 44.9 Mbps, but the third test contained a brief drop to zero and averaged only 38.4 Mbps. That interruption lowered the combined download average to 42.7 Mbps. Because the connection recovered within the same test and the remaining runs were relatively steady, this appears to have been a short-duration event rather than a permanent loss of the wireless link. It is still important because even a brief interruption can affect time-sensitive industrial communications.

The 5 GHz results were both faster and more consistent. Every upload test produced exactly the same reported average of 46.9 Mbps, despite some short variations in the minimum readings. This is an unusually tight set of results and demonstrates very good test-to-test repeatability. Compared with 2.4 GHz, the 5 GHz upload average was approximately 5.1 Mbps higher.

Download performance on 5 GHz was also stable. Individual averages ranged from 45.8 to 47.0 Mbps, producing a combined average of 46.4 Mbps. Unlike the 2.4 GHz results, none of the 5 GHz tests experienced a complete throughput drop. The graphs show some normal variation, but the link remained active throughout all four tests.

Overall, Client NAT mode introduced no obvious throughput instability beyond the isolated 2.4 GHz download interruption. The 5 GHz band was the stronger choice in this lab test, providing approximately 12% more upload throughput and 9% more download throughput than 2.4 GHz. It also delivered much better consistency, particularly for upload traffic.

## Overall Throughput Analysis

Across all three operating modes, the Bolt II generally delivered real-world TCP throughput in the 40–60 Mbps range. Access Point mode produced the highest upload results, averaging about 53 Mbps on both bands, while Cable Replacement mode provided especially strong download performance, reaching an average of 55.1 Mbps on 5 GHz. Client NAT mode was somewhat slower, with averages ranging from 41.8 to 46.9 Mbps, which is reasonable because the Bolt was also translating traffic between two separate IP networks. Overall, 5 GHz held a modest performance advantage, particularly for downloads, while 2.4 GHz remained capable of supporting similar speeds under good lab conditions.

Consistency was generally good, although several individual tests contained brief drops or larger fluctuations. The most significant was a momentary drop to zero during one 2.4 GHz Client NAT download test. Some 5 GHz Access Point tests also showed considerable short-



term variation even though their overall averages remained acceptable. These results suggest that the Bolt II is not designed to be a high-capacity wireless device, but it provides enough throughput for the majority of industrial applications, including PLC communications, programming access, HMI traffic, diagnostics, data collection, and even moderate video use. Its real strength is its flexibility as it can operate as an access point, create a transparent cable-replacement bridge, or connect an isolated group of devices through NAT while still maintaining useful and mostly repeatable throughput.

While documentation lists a maximum Wi-Fi data rate of 867 Mbps, HMS lists the Bolt II's actual net WLAN throughput at approximately 70 Mbps. Across all of the lab configurations, the measured band and mode averages ranged from about 41.8 to 55.1 Mbps, while the highest individual test average reached 59.6 Mbps. Instantaneous results reached as high as 73.4 Mbps. This places the sustained results at roughly 60–85% of the documented 70 Mbps net-throughput figure, which is a reasonable outcome after accounting for Wi-Fi overhead.

It is also important to remember that the Bolt II uses a 10/100BASE-T Ethernet port. Regardless of its 867 Mbps theoretical wireless connection rate, traffic passing between the wired and wireless sides can never exceed the 100 Mbps Ethernet link and the usable TCP throughput will always be lower after protocol overhead.

## Final Thoughts

The Anybus Bolt II by HMS is a well thought out and designed industrial wireless device. It fills several useful roles without becoming overly complicated. It can operate as an access point, connect wired equipment to an existing wireless network, provide NAT separation between machine and production networks, or create a transparent wireless bridge between two Ethernet segments. Its cabinet mounting design places the internal antennas outside the enclosure, while PoE support allows power and communications to share one cable. The web interface is clean and intuitive. It's features such as channel selection, roaming controls, WPA2/WPA3 security, and support for industrial Ethernet traffic make it much more suitable for automation work than a typical consumer wireless bridge.

The throughput results were also appropriate for the Bolt II's intended purpose. They are more than sufficient for most PLC, HMI, SCADA, programming, diagnostic, and data-collection applications. Performance was generally repeatable, and 5 GHz usually provided the best combination of speed and consistency. Cable Replacement mode was particularly useful because it provided transparent Layer 2 connectivity, while Client NAT mode offered a practical way to connect several devices behind the Bolt without extending the production subnet directly into the machine network.

There are, however, some limitations to understand. The Bolt II is a single-radio device, so it can operate on either 2.4 GHz or 5 GHz but not both simultaneously. Its 10/100BASE-T Ethernet interface and documented net wireless throughput of approximately 70 Mbps also mean it should not be treated as a high-capacity Wi-Fi solution, regardless of the much higher theoretical Wi-Fi 5 connection rate. A few tests showed noticeable short-term throughput changes, including one brief drop to zero, which reinforces the fact that wireless performance is never completely fixed or guaranteed. Applications with extremely tight timing, very high bandwidth requirements, or no tolerance for interruption still require careful engineering and may remain better suited to wired Ethernet.

The Bolt II also works best when its operating mode is selected with a clear understanding of the network requirements. Client NAT mode provides useful separation but is not a transparent bridge and can complicate connections initiated from the production network. Transparent Cable Replacement mode solves that problem, but it requires compatible radios and careful configuration. The Bolt II can support many AP clients, but that does not mean its available bandwidth increases as all connected devices must share the same

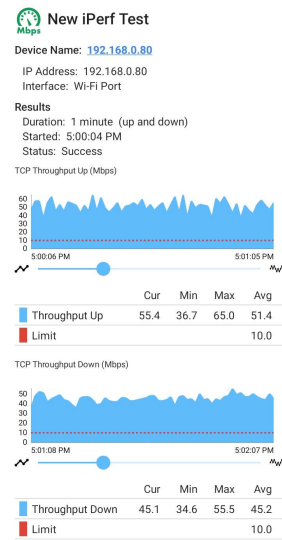
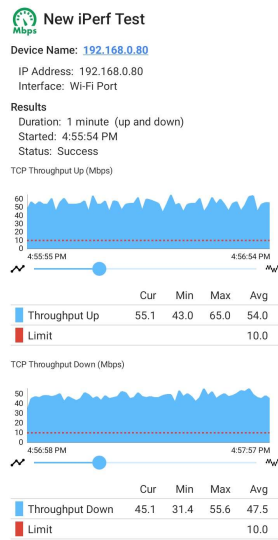
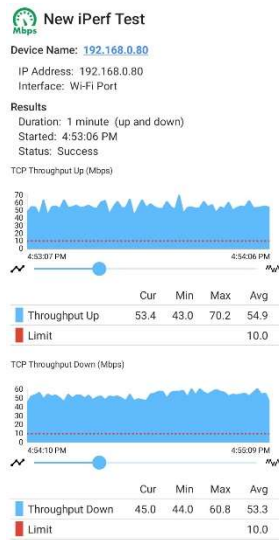


radio capacity. Proper channel planning, mounting, signal coverage, security configuration, and roaming validation remain necessary parts of a successful installation.

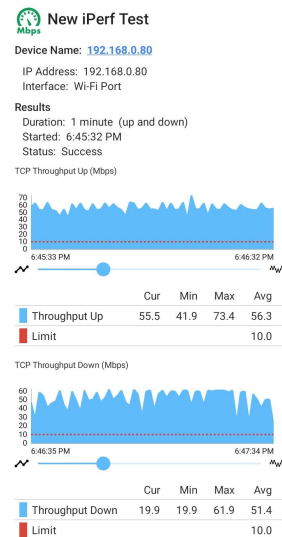
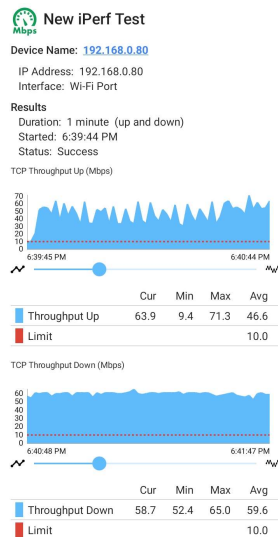
Taken as a whole, the Bolt II is a capable and flexible industrial radio that performs as its documentation suggests. Its value is not in delivering the highest possible wireless speed. Its value comes from packaging several practical industrial networking options into a rugged, compact device that is easy to mount, power, and configure. When used within its limits and matched with the right application, it offers a straightforward way to add wireless access or replace difficult Ethernet cable runs without introducing unnecessary complexity.

## Appendix

### AP Mode Throughput Results



#### 2.4GHz



#### 5GHz

## Cable Replacement Throughput Results

### New iPerf Test

Device Name: 192.168.0.80  
IP Address: 192.168.0.80  
Interface: Wired Port

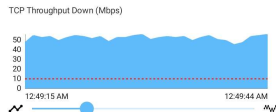
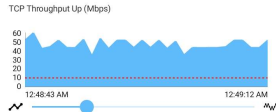
Results  
Duration: 30 seconds (up and down)  
Started: 12:47:05 AM  
Status: Success



### New iPerf Test

Device Name: 192.168.0.80  
IP Address: 192.168.0.80  
Interface: Wired Port

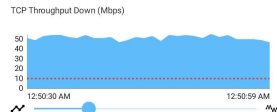
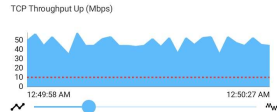
Results  
Duration: 30 seconds (up and down)  
Started: 12:48:42 AM  
Status: Success



### New iPerf Test

Device Name: 192.168.0.80  
IP Address: 192.168.0.80  
Interface: Wired Port

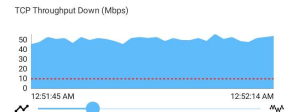
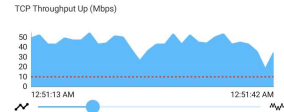
Results  
Duration: 30 seconds (up and down)  
Started: 12:49:57 AM  
Status: Success



### New iPerf Test

Device Name: 192.168.0.80  
IP Address: 192.168.0.80  
Interface: Wired Port

Results  
Duration: 30 seconds (up and down)  
Started: 12:51:12 AM  
Status: Success

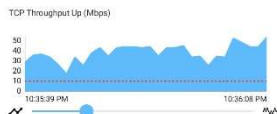


## 2.4GHz

### New iPerf Test

Device Name: 192.168.0.80  
IP Address: 192.168.0.80  
Interface: Wired Port

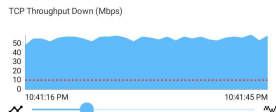
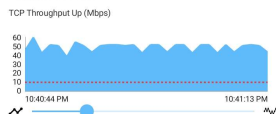
Results  
Duration: 30 seconds (up and down)  
Started: 10:35:37 PM  
Status: Success



### New iPerf Test

Device Name: 192.168.0.80  
IP Address: 192.168.0.80  
Interface: Wired Port

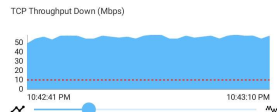
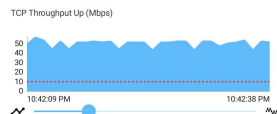
Results  
Duration: 30 seconds (up and down)  
Started: 10:40:43 PM  
Status: Success



### New iPerf Test

Device Name: 192.168.0.80  
IP Address: 192.168.0.80  
Interface: Wired Port

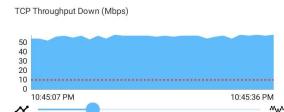
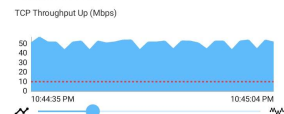
Results  
Duration: 30 seconds (up and down)  
Started: 10:42:08 PM  
Status: Success



### New iPerf Test

Device Name: 192.168.0.80  
IP Address: 192.168.0.80  
Interface: Wired Port

Results  
Duration: 30 seconds (up and down)  
Started: 10:44:34 PM  
Status: Success



## 5GHz

## NAT Bridge Throughput Results

### New iPerf Test

Device Name: 192.168.0.80  
IP Address: 192.168.0.80  
Interface: Wired Port

Results  
Duration: 30 seconds (up and down)  
Started: 12:17:03 AM  
Status: Success

TCP Throughput Up (Mbps)



|               | Cur  | Min  | Max  | Avg  |
|---------------|------|------|------|------|
| Throughput Up | 44.0 | 33.6 | 49.3 | 41.2 |
| Limit         |      |      |      | 10.0 |

TCP Throughput Down (Mbps)



|                 | Cur  | Min  | Max  | Avg  |
|-----------------|------|------|------|------|
| Throughput Down | 45.1 | 37.7 | 47.2 | 43.3 |
| Limit           |      |      |      | 10.0 |

### New iPerf Test

Device Name: 192.168.0.80  
IP Address: 192.168.0.80  
Interface: Wired Port

Results  
Duration: 30 seconds (up and down)  
Started: 12:18:30 AM  
Status: Success

TCP Throughput Up (Mbps)



|               | Cur  | Min  | Max  | Avg  |
|---------------|------|------|------|------|
| Throughput Up | 35.7 | 33.5 | 55.6 | 41.8 |
| Limit         |      |      |      | 10.0 |

TCP Throughput Down (Mbps)



|                 | Cur  | Min  | Max  | Avg  |
|-----------------|------|------|------|------|
| Throughput Down | 44.0 | 38.8 | 48.2 | 44.3 |
| Limit           |      |      |      | 10.0 |

### New iPerf Test

Device Name: 192.168.0.80  
IP Address: 192.168.0.80  
Interface: Wired Port

Results  
Duration: 30 seconds (up and down)  
Started: 12:19:49 AM  
Status: Success

TCP Throughput Up (Mbps)



|               | Cur  | Min  | Max  | Avg  |
|---------------|------|------|------|------|
| Throughput Up | 43.0 | 32.5 | 55.5 | 42.0 |
| Limit         |      |      |      | 10.0 |

TCP Throughput Down (Mbps)



|                 | Cur  | Min | Max  | Avg  |
|-----------------|------|-----|------|------|
| Throughput Down | 43.0 | 0.0 | 47.2 | 38.4 |
| Limit           |      |     |      | 10.0 |

### New iPerf Test

Device Name: 192.168.0.80  
IP Address: 192.168.0.80  
Interface: Wired Port

Results  
Duration: 30 seconds (up and down)  
Started: 12:21:06 AM  
Status: Success

TCP Throughput Up (Mbps)



|               | Cur  | Min  | Max  | Avg  |
|---------------|------|------|------|------|
| Throughput Up | 44.0 | 33.6 | 49.2 | 42.2 |
| Limit         |      |      |      | 10.0 |

TCP Throughput Down (Mbps)



|                 | Cur  | Min  | Max  | Avg  |
|-----------------|------|------|------|------|
| Throughput Down | 44.1 | 40.9 | 47.2 | 44.9 |
| Limit           |      |      |      | 10.0 |

## 2.4GHz

### New iPerf Test

Device Name: 192.168.0.80  
IP Address: 192.168.0.80  
Interface: Wired Port

Results  
Duration: 30 seconds (up and down)  
Started: 12:29:03 AM  
Status: Success

TCP Throughput Up (Mbps)



|               | Cur  | Min  | Max  | Avg  |
|---------------|------|------|------|------|
| Throughput Up | 42.9 | 42.9 | 53.5 | 46.9 |
| Limit         |      |      |      | 10.0 |

TCP Throughput Down (Mbps)



|                 | Cur  | Min  | Max  | Avg  |
|-----------------|------|------|------|------|
| Throughput Down | 49.3 | 39.8 | 52.5 | 47.0 |
| Limit           |      |      |      | 10.0 |

### New iPerf Test

Device Name: 192.168.0.80  
IP Address: 192.168.0.80  
Interface: Wired Port

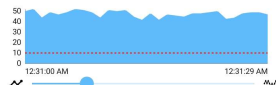
Results  
Duration: 30 seconds (up and down)  
Started: 12:30:27 AM  
Status: Success

TCP Throughput Up (Mbps)



|               | Cur  | Min  | Max  | Avg  |
|---------------|------|------|------|------|
| Throughput Up | 52.4 | 34.6 | 53.5 | 46.9 |
| Limit         |      |      |      | 10.0 |

TCP Throughput Down (Mbps)



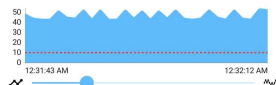
|                 | Cur  | Min  | Max  | Avg  |
|-----------------|------|------|------|------|
| Throughput Down | 46.2 | 40.9 | 51.4 | 46.8 |
| Limit           |      |      |      | 10.0 |

### New iPerf Test

Device Name: 192.168.0.80  
IP Address: 192.168.0.80  
Interface: Wired Port

Results  
Duration: 30 seconds (up and down)  
Started: 12:31:42 AM  
Status: Success

TCP Throughput Up (Mbps)



|               | Cur  | Min  | Max  | Avg  |
|---------------|------|------|------|------|
| Throughput Up | 52.5 | 42.9 | 53.4 | 46.9 |
| Limit         |      |      |      | 10.0 |

TCP Throughput Down (Mbps)



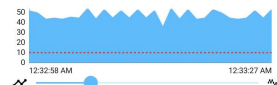
|                 | Cur  | Min  | Max  | Avg  |
|-----------------|------|------|------|------|
| Throughput Down | 44.1 | 39.8 | 50.3 | 45.8 |
| Limit           |      |      |      | 10.0 |

### New iPerf Test

Device Name: 192.168.0.80  
IP Address: 192.168.0.80  
Interface: Wired Port

Results  
Duration: 30 seconds (up and down)  
Started: 12:32:57 AM  
Status: Success

TCP Throughput Up (Mbps)



|               | Cur  | Min  | Max  | Avg  |
|---------------|------|------|------|------|
| Throughput Up | 52.4 | 34.6 | 53.5 | 46.9 |
| Limit         |      |      |      | 10.0 |

TCP Throughput Down (Mbps)



|                 | Cur  | Min  | Max  | Avg  |
|-----------------|------|------|------|------|
| Throughput Down | 38.8 | 36.7 | 50.3 | 45.8 |
| Limit           |      |      |      | 10.0 |

## 5GHz