

# Finally, a Full Duplex Point to Point radio solution at a competitive price

Tranzeo Wireless Technologies' new High Performance Full Duplex Dual Radio models allow more data to travel through the same amount of radio spectrum with significantly less delay, improving applications such as Voice over IP (VoIP) and Internet TV.





**Unlike traditional single radio solutions where a single radio performs both transmitting and receiving in sequence, this high performance system utilizes two radios, allowing data to flow in both directions at the same time.**

The unique design of this product allows the use of interchangeable filters to adjust the unit's operation to meet changing needs and demands. With at least 65 dB of adjacent channel rejection, multiple radios can be collocated without an impact on performance.

These units support operation in 5, 10 and 20 MHz wide channels. Unlike some other solutions, the radio's filtering matches the channel size, meaning that the radio will only listen to the channels you want. Combined with Tranzeo's proven simple-to-install mounting system, and alignment LED's visible in full sunlight, this fully integrated unit offers a rugged, powerful solution at a price that anyone can afford.

## How does it work?

This radio system combines Tranzeo's Patent Pending Routing Mechanisms with onboard radio filtering with Channel Shield technologies. The onboard filtering can significantly reduce adjunct channel noise, improving the overall system performance.

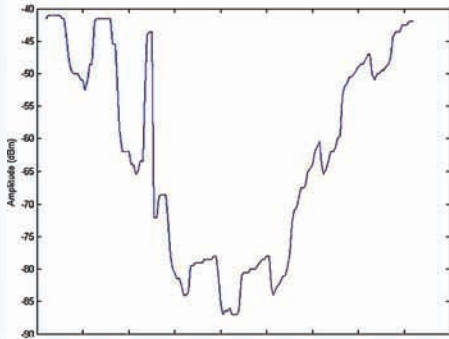
In Figure 1, we see the effects of narrowband channels that do not use the Tranzeo method. In this test, the graph represents the strength an interfering signal would need to be to cause a 10% Bit Error Rate when operating at 5 MHz channel.

As you can see, the radio is affected by adjacent channels, greatly impacting on overall performance. As a result, although the card is transmitting across 5 MHz, it is in fact listening on 20 MHz channel.

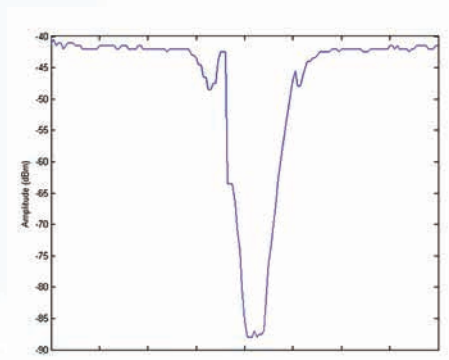
In Figure 2, we can see the much narrower filtering in the Tranzeo Wireless Technologies firmware, using the very same radio. As you can see, the radio is rejecting the adjacent bands, allowing for more spectrum reuse. Up to 4 links can be placed literally side by side without interference.

However, this filtering alone is not sufficient to allow each radio to operate in isolation. Unlike a single board computer with two card slots, this system has been designed to create two completely isolated radio systems, preventing receiver desensitization of the radio caused by a

second radio being so close. 802.11a radios have onboard filtering that is designed to reject 50 dB of adjacent noise. The near-field emissions of a PC card within can be so powerful - especially in comparison to the signals that are being received from the remote station - as to cause the receiver to lose sensitivity.

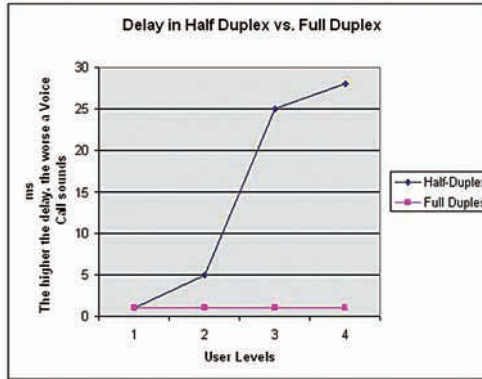


**Figure 1: Traditional narrowband Receive Filtering**



**Figure 2: Tranzeo's narrowband Receive Filtering**

Each radio, in fact, has a minimum of 65 dB Adjacent Channel rejection, resulting in virtual channel isolation. With directional antennas, the same channel can be reused on the same tower multiple times. This allows for greater use of the same spectrum in one area, increasing density without vastly increasing the noise.



Additionally, each radio in the link is driven by its own 250 MIPS network processor, with 16 Mb of RAM for processing data. These units are capable of up to 3,000 packets per second in each direction. As a result, the system can achieve throughputs of up to 23 Mbps in TCP, and 28 Mbps in UDP! That's more than enough to link together multiple buildings.

To ensure that network loops and other performance impacts cannot occur within the link, the system uses Tranzeo's Patent Pending Routing Mechanism. Tranzeo's Patent Pending Routing Mechanism incorporates Tranzeo's proven PxP Technology, ensuring that information is correctly routed between the radios, without modifying the packet's header in any way. This allows for MAC based authentication requests, VPN and VLAN packets to traverse the wireless segment intact.

The system also reduces the latency of the system by ensuring a clear path for TCP ACKs. In a Half Duplex system, packets are delayed waiting for an ACK, tying up the medium in order to receive a very small packet. In the Tranzeo Full Duplex system, the ACK returns on the receiving frequency, freeing the transmission channel to transmit other data in the queue.



## Tranzeo Ordering Information

TR-FDD-24 Integrated 24 dBi  
TR-FDD-N Connectorized

## Antenna Options

29 dBi dish with radome  
32 dBi dish with radome

All units are shipped complete with POE with built in Lighting Protection, LMR400 Cable, mounting hardware and power supply.

## Suggested Applications

- Video Transmission
- VoIP Backhaul
- Leased Line Replacement
- Private Wide Area Networks
- ISP Backhaul

## Channel Shield Options

NAME	LOW BAND	HIGH BAND	AVAILABLE
CG1	5745	5825	<b>Now</b>
CG2	5745	5785	<b>Now</b>
CG3	5765	5805	<b>Now</b>

At the RF level, the system also reduces latency and improves throughput by allowing the user to adjust the RF ACK time, changing the amount of time the system will wait for an RF ACK to be returned. Radio waves take a finite amount of time to reach a destination, namely the speed of light. Every packet sent via an RF link needs to be acknowledged, in order to ensure that the packet was received intact. Even at moderate distances, the ACK time defaults are set too short in 802.11, causing the unit to retransmit RF packets. By allowing for distance adjustment, and fine tuning in microseconds, the throughput can be vastly improved.

Half Duplex systems work fine in many cases, especially when used for asymmetrical data links such as Customer Premise Equipment. However, when used as a backhaul, when Half Duplex systems reach capacity, the latency can greatly increase. The effects this can have on a backhaul where data flows are often symmetrical can cause increases in jitter, latency and overall performance.

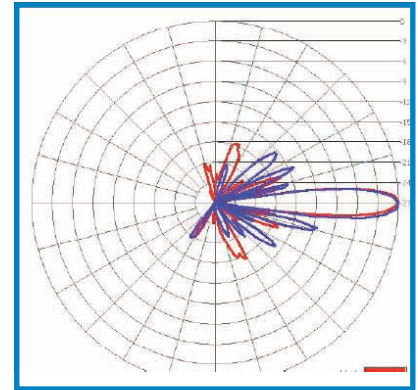
The proof of any product is how it performs in the field, not on the bench. In testing, with links some 12 kilometers apart, there was a repeatable increase in bidirectional UDP throughput of 267% versus a pair Tranzeo Wireless Technologies TR-5Plus-24 units at the same location. But, what about a TCP link, TR-32 dBi Dish where the ACK can have a significant impact? TCP throughput increased by at least 235% in the same test.

By combining all these features with a high powered +13 dBm radio, these units are built for long distance links. But, since the power is fully adjustable, the user can scale back the power for closer installations, avoid noise issues and to meet local regulatory requirements.

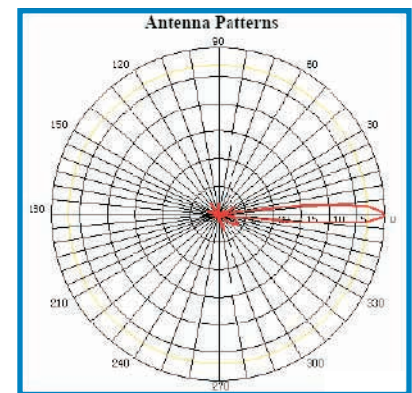
Fully backed by an industry-leading three year warranty, and built to last in the toughest environments, these units are designed to be used outdoors. Our design requirements for this platform demanded that the unit cold start after being frozen at -60°C for 48 hours. The unit had to immediately boot up and pass traffic. It does. Yet, the design also allows the unit to operate at 140°F (60°C) without any external heat syncing. Designed by installers for installers, this is the simplest system to install. A spanner and a cable crimper are all you need in your toolbox. Each radio in the system has an externally visible high brightness LED alignment system. Clearly readable in full sunlight, alignment is simple. No headset with wires to get in the way; no need to drag a heavy laptop up the tower.

With these units, even the POE (Power Over Ethernet) is designed for use with outdoor equipment. Designed by Tranzeo for our radios, this low-cost POE is capable of shunting thousands of watts of surge in less than a billionth of a second. The POE can be hit multiple times and will still protect the radio, as well as the device that it is attached to. Despite this, it can support cable lengths of up to 330 feet (100 m). Solar friendly, the system has a total draw of less than 18 watts, far lower than many other devices on the market today.

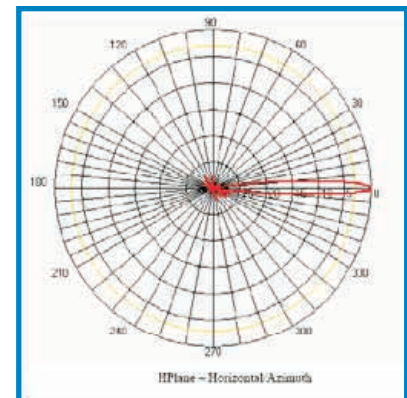
Despite all of these powerful features, the system offers a simple web based interface that make configuration fast and simple. Configuration changes can be rolled back at the click of a mouse. The Tranzeo firmware can be updated remotely from anywhere in the world, even over the link itself. Truck rolls for a firmware upgrade can be avoided. Even security is easy with these devices. Capable of supporting WPA and WPA II, a secure link has never been easier.



24 dB Internal



TR-29 dBi Dish



TR-32 dBi Dish

**Communicate Without Boundaries.**



CALL 604-460-6002 TOLL FREE 1-866-872-6936 [www.tranzeo.com](http://www.tranzeo.com)