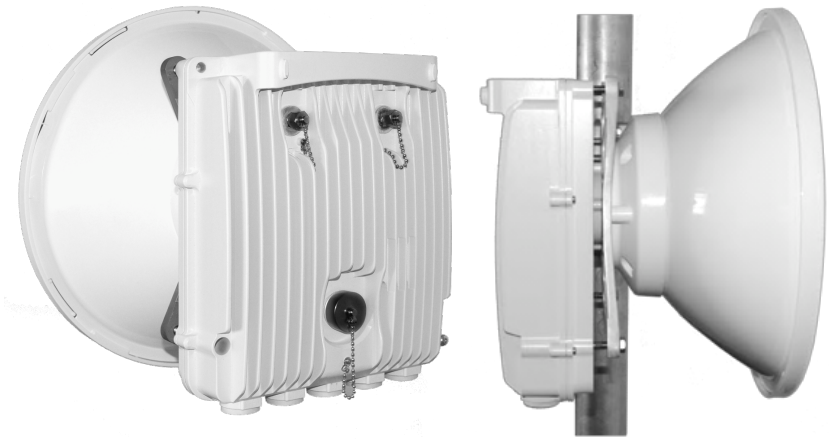
Introduction and Highlights

This product description gives a technical overview of TPR 3000 series radios. They are groundbreaking, all-outdoor, point-to-point microwave radios with integrated Ethernet switches. There are two variants: the TPR 3100; and the TPR 3200. The external packages are identical, apart from the lower frequency models that have extra depth, but the transceiver and diplexer configurations differ.

Figure 1-1 TPR 3000 with antenna



Cutting Edge Radio Performance

TPR radios have standout performance in several areas, making them an attractive solution for a wide range of applications. These include telcos, mobile operators, enterprises/corporates, utilities, and governments.

The highest capacity single-transceiver radio on the market

- 2.5 Gbit/s throughput in an all-outdoor unit (5 Gbit/s with LoS MIMO)
- Unique Adaptive Dual Carrier technology (A2C)

Superior RF capability with greater reach

- Longer hops, up to 50km or more, with superior gain and smaller antennas
- 4096 QAM with adaptive modulation (ACM) offering enhanced spectral efficiency optimized for path conditions
- Transmit output power above 30dBm (1W)
- Up to 112 MHz channels (ETSI) or 80 MHz (ANSI)

Single or dual-header options to optimize hardware and channel space

- The single transceiver TPR 3100 provides single or dual carrier with a single RF module – offering lower weight and power drain, higher MTBF, and reduced cost
- The dual transceiver TPR 3200 offers RF hardware redundancy and flexibility for single or dual-polarization to match your spectrum constraints

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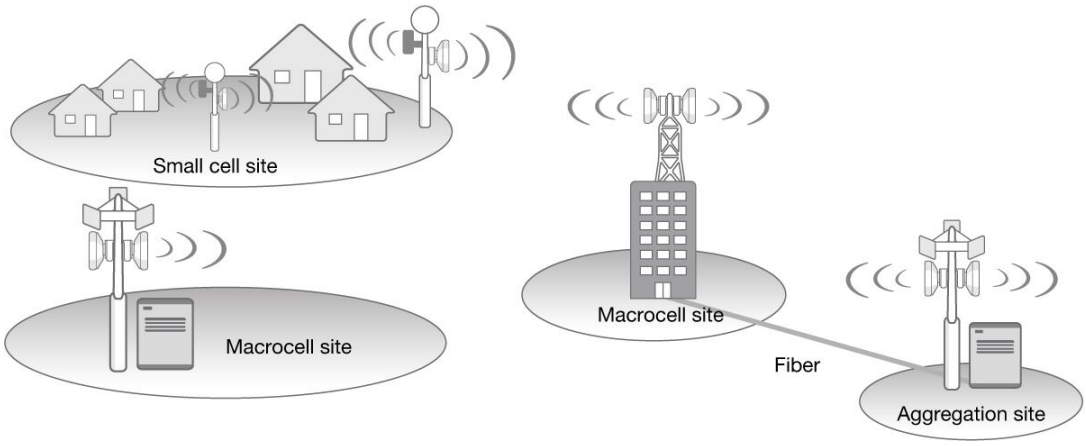
Customer Applications

TPR 3000 radios are an attractive solution for a wide range of scenarios, including:

- Mobile backhaul
- Telco backhaul and access
- Internet Service Providers
- Enterprise and private data networks for businesses and campuses
- Local government and public safety
- National and federal government
- Utilities including electricity, gas, and water

Mobile Backhaul

Figure 2-1 Mobile Network Applications



TPR 3000 radios set a new industry benchmark for 4G and 5G mobile backhaul applications, as well as a fast and cost-effective linking solution for legacy networks.

Key advantages include:

- Capacity gain in existing spectrum allocations through 4096 QAM – scalable from 20 Mbit/s to 5 Gbit/s
- Comprehensive Layer 2 and 3 protocols allow intelligent transport and better network performance

Integration into your network is straightforward with:

- Simple incorporation into existing macro cell sites
- Easy deployment alongside small cells (like rooftop or street-level), with minimal weight, size, and pole space/loading
- Easy deployment in urban areas with minimal visual impact, and no space needed for separate antenna (increasing site utilization)
- Congestion relief for traditional urban microwave (18 to 42 GHz)

Physical/ hardware

The TPR 3100 and TPR 3200 have the same compact physical housing and connectors, except for varying chassis depth.

Figure 4-1 TPR 3000 Rear View Showing Interfaces

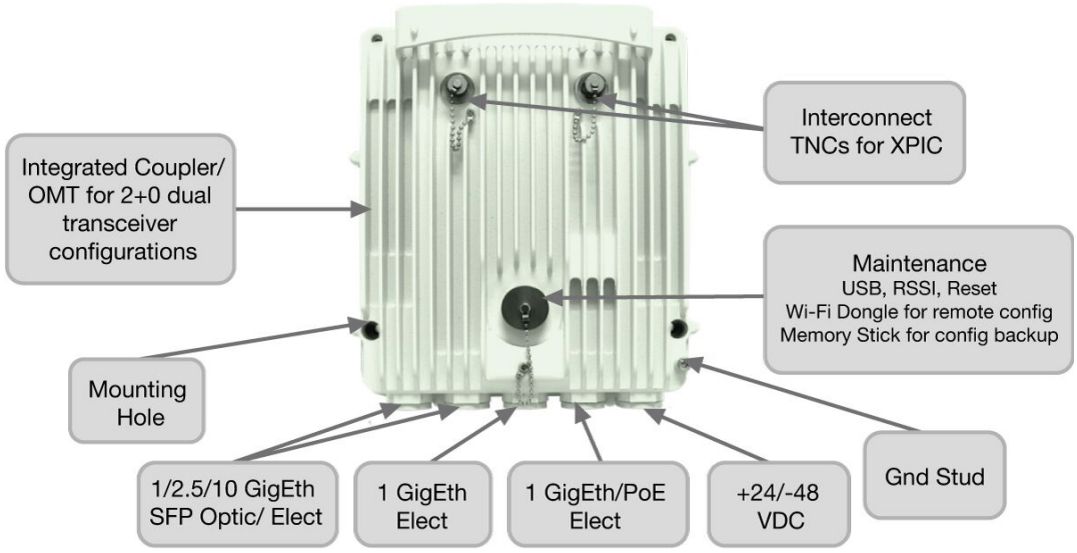
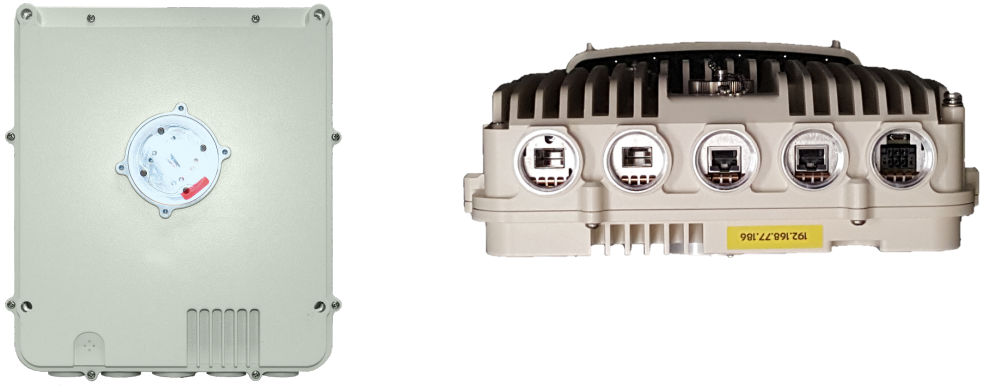


Figure 4-2 TPR 3000 Front and Bottom Views



Dimensions and weights are as follows:

Model	Dimensions	Weight
TPR 3100 (all frequencies)	302 x 272 x 95 mm (11.89 x 10.71 x 3.74 ”)	Up to 5.5kg
TPR 3200 (13 – 42 GHz)	302 x 272 x 95 mm (11.89 x 10.71 x 3.74 ”)	Up to 6.5kg

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Quality of Service (QoS)

QoS prioritizes service for different types of traffic. Higher priority should be given to delay-sensitive multimedia traffic, such as voice and video, otherwise it may become unusable on congested networks through delays and dropped frames.

QoS is also used to ensure fulfilment of customer service level agreements (SLAs).

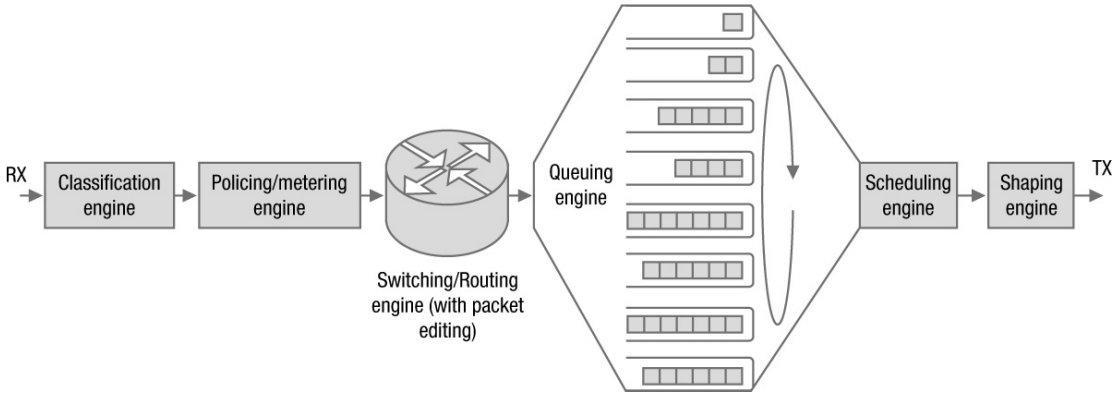
With restricted network throughput, traffic is buffered, queued, and prioritized for transmission. This optimizes traffic flows to ensure uninterrupted throughput for high priority traffic at the expense of lower priority traffic.

This is especially relevant to TPR 3000 configurations where adaptive modulation (lower QAM level) reduces radio link capacity in fade conditions.

How it Works – Overview

The various stages of QoS are shown below in Figure 6-6 within a switch.

Figure 6-6 QoS Function End-to-End



Classification

When an Ethernet frame is received, it is first processed by the classification engine to assign a particular traffic class (priority and color) according to priority markings within the frame.

Policing

This enforces service level agreements, which define throughput availability to particular classes or streams of traffic. It marks the frame as green, yellow, or red, and prescribes certain actions respectively.

Queuing

Once the core switching and routing sends the frame to the right outgoing port, it is queued there. In the case of congestion (when the port cannot handle all traffic), the frame waits its turn. If the queue is full, the frame may be dropped. Queue sizing and drop characteristics may be configured to suit requirements.
