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**TR-AP5A Test Report**  
**Appendix E – Operational Description**

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## E.1 Operational Description

The TR-AP5A product family is a wireless network bridge designed specifically for outdoor applications. The device provides a bridge between IEEE802.3 wired Ethernet LANs and IEEE802.11a compliant wireless networks. It uses an external antenna coupled with a 802.11a transceiver to connect to remote wireless clients. The transceiver is connected to N-female and operates in the frequency band 5250-5350 and 5725-5850 MHz. The device transmits digital network data. The unit is mounted externally in fixed point-to-point installations. It is mounted on the exterior of a building or, typically for broadband internet access.

The type of RF modulation is OFDM. The device can transmit data at a bit rate of 54 Mbps or a real-world data rate of approximately 27 Mbps. 64/128 bit Wired Equivalent Protection (WEP) algorithm is used for secure communications. The device's standard compliance ensures that it can communicate with any 802.11a network.

The firmware used with the device prevents the use of channels outside the 5.250-5.350 and 5725-5850 MHz bands. It also limits the output power of the device, based on the antenna gain, to maintain compliance with the 15.407 EIRP limits when using the 5.250-5.350 MHz band.

In line with the IEEE 802.11a standard an OFDM physical layer (PHY) splits an information signal across 52 separate subcarriers to provide transmission of data at a rate of 6, 9, 12, 18, 24, 36, 48, or 54 Mbps. Four of the subcarriers are pilot subcarriers that the system uses as a reference to disregard frequency or phase shifts of the signal during transmission. A high speed Fast Fourier Transform (FFT)/Inverse Fast Fourier Transform (IFFT), combined with BPSK, QPSK, 16QAM and 64QAM modulation of the individual subcarriers, provides the data rates of 6, 9, 12, 18, 24, 36, 48 and 54Mbps, with rate compatible punctured convolutional coding with a coding rate of 1/2, 2/3, and 3/4.

In the 802.11a standard, a pseudo binary sequence is sent through the pilot subchannels to prevent the generation of spectral lines. In 802.11a, the remaining 48 subcarriers provide separate wireless pathways for sending the information in a parallel fashion. The resulting subcarrier frequency spacing is 0.3125 MHz (for a 20 MHz with 64 possible subcarrier frequency slots).

The OFDM PHY layer consists of two protocol functions: first a PHY convergence function, which adapts the capabilities of the Physical Medium Dependent (PMD) system to the PHY service. This function is supported by the Physical Layer Convergence Procedure (PLCP), which defines a method of mapping the IEEE 802.11 PHY Sublayer Service Data Units (PSDU) into a framing format suitable for sending and receiving user data and management information between two or more stations using the associated PMD system. Second a PMD system whose function defines the characteristics and method of transmitting and receiving data through a wireless medium between two or more stations, each using the OFDM system.

**The TR-AP5A-N product is used exclusively in a professionally installed, fixed point-to-point environment.**