

Network Guide

AeroMate™ WSC
(Wire Sensors and Controls)

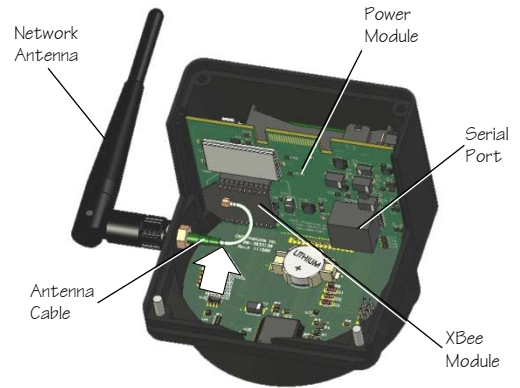


ZigBee 2.4 GHz Mesh Network

Compatible with Digi International
Drop-In Networking Components

U.S. Patent Numbers 6,194,793 and 6,462,507
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Network Components



XBee and
XBee-Pro

The Xbee ZNet modules plug into the power module as shown above. The modules are factory configured for use as a Coordinator, Router or End Device functions. Coordinators and Routers are typically used with the AM9100 Uplink Manager application module. All other AeroMate Application modules are, normally, configured as End Devices.

Coordinator

A Zigbee Personal Area Network (PAN) consists of one Coordinator and one or more End Devices and/or Routers. The Coordinator establishes a PAN and then allows End Devices and Routers with the same PAN ID to join the PAN. There is a limit of 8 End Devices that can join the PAN through a single Coordinator.

Router

Routers extend the PAN range and allow additional End Devices to join the PAN via the Router. Like the Coordinator, there is a limit of 8 End Devices that can join the PAN through a single Router. Although there is no limit to the number of Routers that can join the PAN, a practical limit of 2 Routers is recommended.

End Device

End Devices or "sleeping nodes" are the discrete sensor and control units joined through the common PAN and managed by a single Coordinator. Adding a Router to the PAN allows up to eight more End Devices to join the same PAN. A single PAN can include 16 End Devices using a single Coordinator and one or more Routers.

Network Setup

A network status display provides network connection status and allows the user to modify the PAN ID to match the Coordinator. In order for a new device to join the PAN, the Coordinator must be power cycled and then the new device with the same PAN ID is power cycled within 15 seconds of power cycling the Coordinator.

XBee configuration type and settable PAN ID number.

DEV	Link	PAN#
ED	YES	1134

Use Cursor key to change the ID#.



Change selections.

Network Update Interval (NUD) determines how often an End Device wakes up to interact with the PAN. All devices with the same PAN ID must have the same NUD. The default NUD is 3 seconds. The Log Update Interval (LUD) is associated with a device's data logging function.

LUD is user settable.

NUD	LUD
YES	00300s

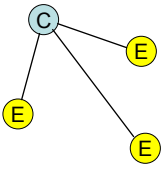
Use Cursor key to move between entry fields.



Change selections.

Network Topology

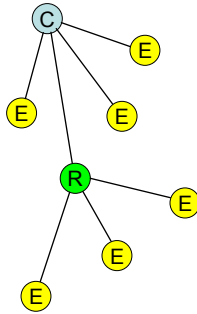
Point-to-Point



The simplest network setup is a Point-to-Point topology with a Coordinator linking up to eight End Devices in a Personal Area Network or PAN. Distance from a Coordinator to an End Device can be up to 4000 ft. (1 km) line of sight using an XBee-Pro.

The mesh network topology is more complex but allows the range to be extended to reach more distant End Devices using Routers. Each Router can add up to eight more End Devices to the PAN.

Mesh



A "closed" ZigBee PAN requires that the Coordinator and Router or End Device be power cycled to join the network. The PAN ID number must be the same as the Coordinator.

C = Coordinator

E = End Device

R = Router

Data Log Retrieval

A convenient way to interact with XBee enabled devices at a range of up to 1 mile (1.2 km) LOS with a laptop PC computer. The XBee-Pro USB adapter plugs into and is powered by the laptop PC USB port. When using an AeroMate as a standalone data logger, this XBee-Pro USB adapter may be used to download log data from a nearby vehicle.



XBee-Pro USB

XBee Adapters



RS-232
RS-485
1-Wire
USB

Digi International provides a range of XBee adapters that allow non-AeroMate units to join the PAN and monitor vTagNet OPC data packets. Adapters include serial RS-232, serial RS-485, 1-Wire sensor and USB to XBee converters. Adapters are sold as individual units and are approved for use in Class 1, Division 2 hazardous locations. Wireless range for these adapters are the same as with the standard XBee network modules.

Network Extender



XBee/900 MHz Bridge

The 900MHz Xtender/XBee bridge is the perfect solution for extending the network range up to 10 miles (12 km) LOS. The bridge allows seamless bi-directional data to flow between the long range 900 MHz modem and the short range XBee module. Two of these 7-28 VDC powered RF bridges are required to extend the network connection of PAN associated End Devices.

XBee Gateway

The Digi ConnectPort X8 product provides direct access to the internet through standard cellular GPRS or CDMA accounts and includes an XBee-Pro module for access to the local network. With the ConnectPort acting as the network Coordinator, direct internet access, extended data storage and Python language programming dramatically increase the reach and functionality of networked End Devices.



ConnectPort X8

Drop-In Networking

Part Number	Accessory Description
1980-2401500	XBee-Pro PKG-U USB. Maxstream 2.4 GHz USB Adapter. 1 mi.(1500m) Line of Sight range.
1980-2410232	XBee / RS-232 Adapter. Maxstream 2.4 GHz Zigbee DB-9M, 9-30 VDC, Class 1 Div 2
1980-2410485	XBee / RS-485 Adapter. Maxstream 2.4 GHz Zigbee 6-Position Block, 9-30 VDC, Class 1 Div 2
1980-2410199	XBee / 1-Wire Temperature Sensor. Maxstream 2.4 GHz Zigbee RJ-45, 9-30 VDC, Class 1 Div 2
1980-2411100	XBee / USB Adapter. Maxstream 2.4 GHz Zigbee USB 2.0, Bus Powered, Class 1 Div 2
1980-2410900	Xtender / XBee RF Bridge. 900 MHz, 24. GHz Zigbee 14 mi. (22 km) Line of Sight Range
1980-2411801	ConnectPort x4 Gateway. Cellular CDMA/GPRS, 2.4 GHz Zigbee Python Language Programmable