



Bridge Systems ATEX Wireless Mesh Networks

Fundamentally a mesh network gives you the convenience of a wired network switch combined with the deployment flexibility of wireless network technology. A mesh network can be set up and deployed in a matter of minutes with little effort, or alternatively be laid out as a permanent part of the infrastructure of a site, factory, warehouse or city in some cases.

The design of a mesh network makes it ideal for locations where cabling is too difficult or expensive to implement. A mesh network can be used as a primary network or as an extension to an existing wired network; the wireless technology offers a way to extend network coverage into hard to access locations and offers additional equipment flexibility by being able to connect IP devices to the mesh nodes.

Mesh networks can operate in or outdoors in the 2.4Ghz and 5Ghz bands and with the use of ATEX enclosures, antennas or isolation equipment pose no risk in areas that are hazardous such as the petro-chemical industry.

With its self-healing capabilities and traffic prioritisation (Qos) a mesh network can offer a solution for critical high bandwidth low latency applications such as video, voice and data.

A mesh network is designed to operate seamlessly with existing network equipment; it is fully compliant with all the applicable standards including security standards. This means there are no issues with the use of firewalls or other techniques to protect or restrict access to existing corporate networks for security also there are no special network deployment restrictions. The hardware of this system can be deployed onto existing structures, lighting towers, buildings, anywhere where there is local power.

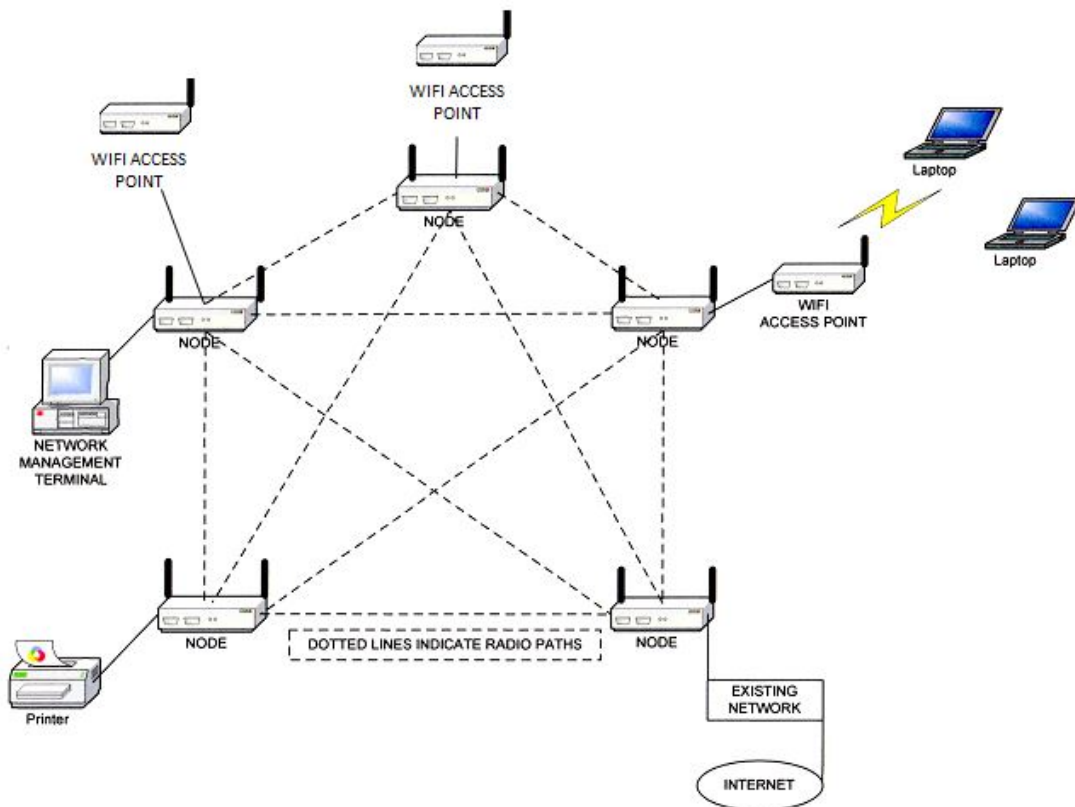
In essence the mesh operates at layer 2 as a large Ethernet switch.

Applications

- Video Surveillance - using IP cameras
- General Ethernet data connectivity for temp or permanent LANs -This technology is useful for extending Ethernet access to a location in support of voice over IP etc. this could be a temporary installation or a difficult area to install cable.
- Backhaul for access point deployment - With the addition of extra equipment i.e. Wi-Fi access points, a mesh network is useful for temporary internet access e.g. temporary accommodation blocks or connection to a corporate network for temporary offices, this eliminates the need to lay cable. Users would be presented with an Ethernet (RJ-45) connector or Wi-Fi just like from your ISP (Internet Service Provider)

- Mobile applications - a mesh can be used to deliver data to vehicles; with its roaming capabilities vehicles can move from zone to zone and stay connected (large networks).

Example of a typical Mesh Network



Mesh Basics

The mesh network consists of a number of “nodes”; these units are small transceivers that connect to each other wirelessly. Each node makes multiple connections with any other nodes that it can establish radio communication with (these connections are represented by the dotted lines in the above diagram). The software that each of these nodes runs constantly monitors each of the connections to find the best and most efficient path for the data to flow through the network. It is these multiple connections that provide the redundancy in the network. If you lose a node through loss of power or a node becoming faulty or indeed, if the radio path between nodes is compromised and the communication is lost, the software identifies this and reroutes the traffic accordingly maintaining the operation of the network. The same principles are applied when you add a new node, the software seamlessly converges the new node into the system.

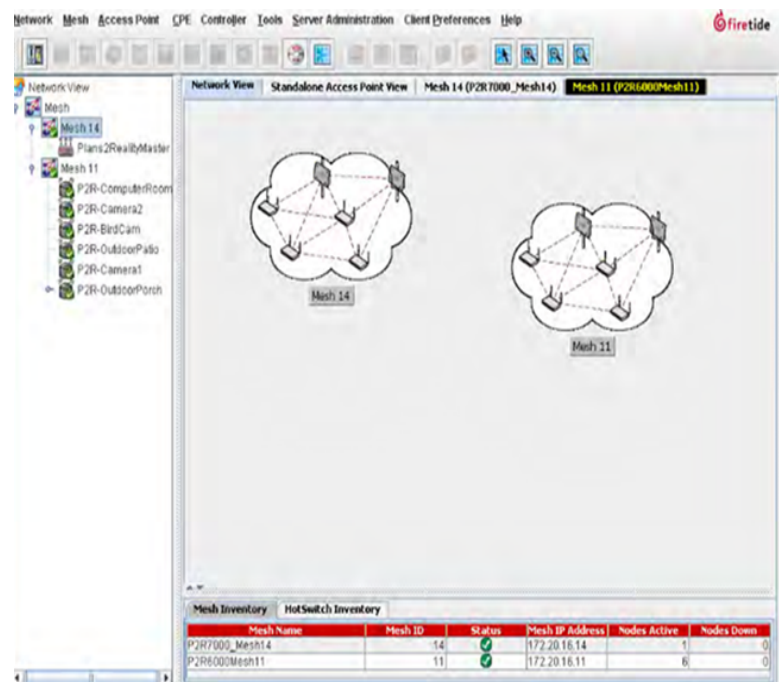
The nodes form the backbone of the network; imagine a large Ethernet switch encompassing your whole site. This allows for the connection of other IP equipment to the nodes directly for quick minimal setup operations.

The internal communication between the nodes is kept separate from the payload or user traffic to maximise the user throughput this and the use of protocols such as 802.11n and technologies like dual radio technology and MIMO (multiple in multiple out) allows for throughput speeds of up to 300-400 mbps depending upon equipment and the configuration you are using.

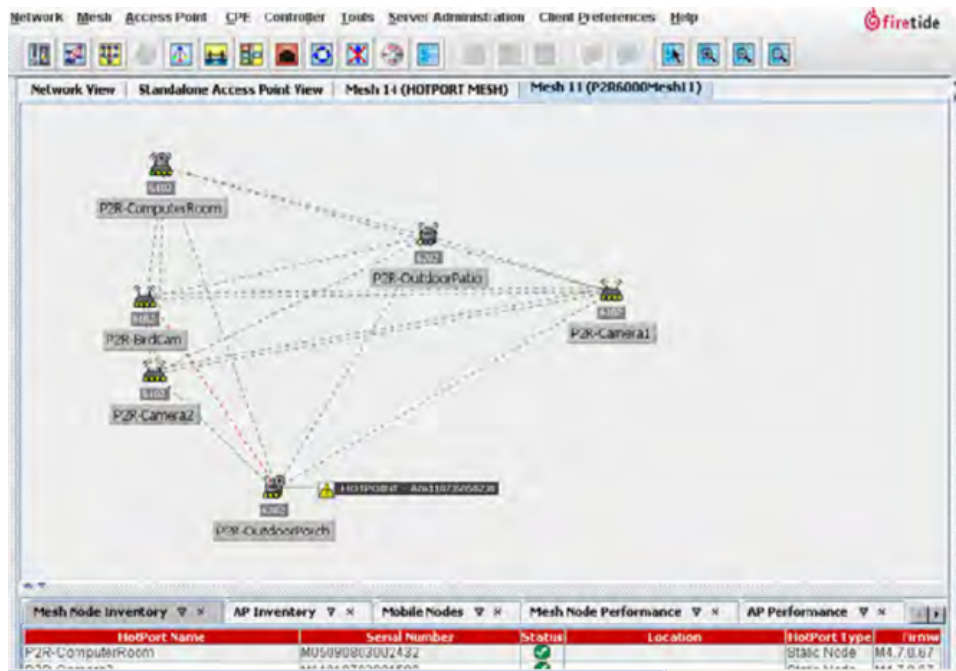
- Dual Radio Technology - The nodes have two radios in them one deals with the internal communications e.g at 2.4Ghz and the other deals with the user traffic at another frequency e.g 5.8Ghz.
- Mimo (Multiple In Multiple Out) - A technology that uses multipath (radio reflections) to produce a bigger bandwidth. A radio receiver receives two copies of the transmitted signal, one copy directly from the transmitter the other is received by the way of a reflection from an object fractionally later than the first. Multiple antennas are required for this.
- 802.11n is the latest in Wi-Fi protocol's.
- ATEX - All nodes can be housed in ATEX enclosures along with the use of ATEX antennas or galvanic isolators (these devices allow for the use of normal antennas due to complete electrical isolation) to enable the mesh network to operate in restricted hazardous areas.

Network Management

All of the mesh node manufacturers produce a management software package for the configuration and running of the network .This software would be loaded onto a terminal that has an IP connection to one of the nodes in the system. This is usually a graphical based craft tool that allows the individual configuration of nodes and the network as a whole. **Encryption is configured here to allow secure communications.** Real time monitoring is also available to ensure the optimal operation of the network and also detailed diagnostics for identifying a problem in the event of a fault. The management of a single mesh or multiple meshes can be done from one point as the screenshot below shows.



The next screenshot shows you the Real time monitoring of a network, the dotted lines are the connections between the nodes. Node configuration can be done from here, diagnostics and the IP setup. Essentially all the networks day to day running can be managed from here. This software can be loaded onto multiple terminals to allow monitoring to be done from more than one location as long as one has a connection into the mesh.



The management software that is provided these days really is spectacular and intuitive to use.