



InspiAir and Mesh Comparison



Executive summary

InspiAir wireless technology can be used in different applications for every need, civilian, Homeland security and virtually any other IP based application that need to be extended from the cabled LAN (Local Area Network) to an extended wireless LAN or MAN (Metropolitan Area Network).

InspiAir solution is cost effective and fast to install. System maintenance is easy to achieve while keeping the maintenance costs to minimum.

This document will show a comparison between InspiAir solution and the Mesh networks solution.

In order to perform such comparison we have chose a campus deployment scenario.

The campus scenario is based on actual university site using InspiAir system.



InspiAir Solution Key Benefits & Advantages:

- Anything, Anytime, Anywhere triple play Video, VoIP and Data wireless communication.
- Proven solution for large area and extended range, urban and mobile environment, indoor / outdoor and transition between the two.
- Operation in the license free 2.4 GHz band.
- Experienced in high data rate wireless communication.
- Focuses on Wireless MAN applications.
- Globalization: Focused technology development with local implementation and support centers.

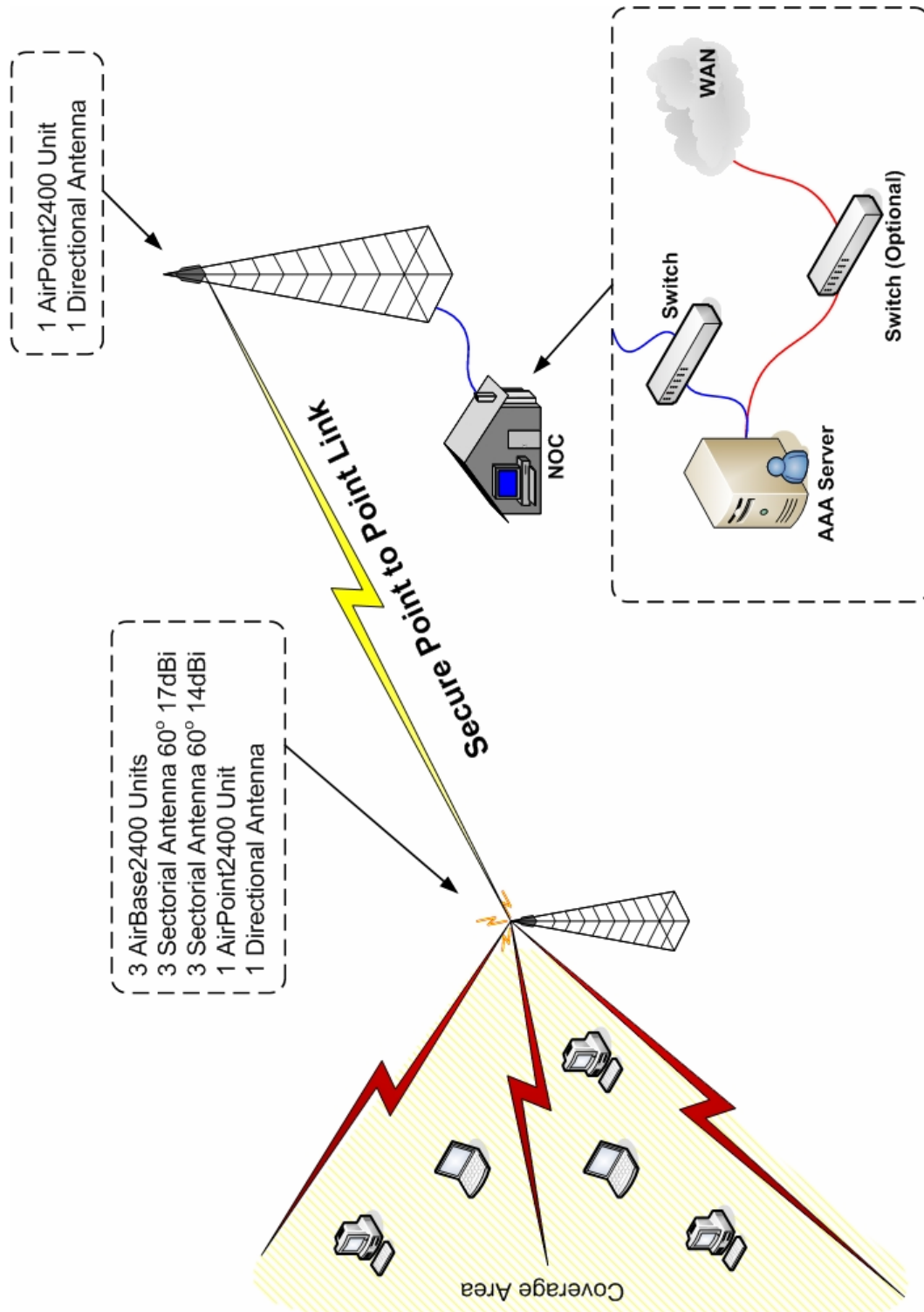
InspiAir technology & algorithm, the VTM (Virtual Transmitting Manager), enhances transmission in the 802.11b standard Radio Frequency (RF) Frame.

VTM Key Benefits:

- RF Frame Latency is reduced to up to 7ms.
- RF Routing Protocol (RP) - Multiple Entry Point and Multiple Exit Point.
- Improve signal quality, InspiAir network can be set to be operational on the same channel, while other networks are operating in the area, without being affected.
- VTM Knowledge (“Spanning Tree” method) - represents the proximate Access Points (AP) transmitting units.
- Extended support - Associate a single client to more than 4 AP simultaneously
- Point to Point links of up to 40Km with standard power limits (ETSI/FCC) and while keeping compliancy with the 802.11b standard.
- Point to Multipoint networks that cover up to 5Km with standard power limits (ETSI/FCC) and while keeping compliancy with the 802.11b standard.
- Using InspiAir technology the network users can enjoy a fast, reliable network that keeps you always connected using smart and fast (<7ms) handoffs. The network users will enjoy high bandwidth, secure authentication process and without a need for a special CPE.

InspiAir network Topology:

The following figure describes a generic system deployment plan.





The AirBase2400 units are generating a wireless network over the coverage area. Each subscriber in the area can be connected to the network by using a standard 802.11b CPE (PCMCIA/PCI/USB) that are attached to their laptops and PCs.

Each users authenticates by a username and password to the AAA server that is based in the **Network Operation Center (NOC)**. After a successful authentication process a tunnel is opened for the user to the WAN, and from that moment on, the user can enjoy the network services (Data, VOIP, Video) while his session data is being collected for billing purposes (Session time, upload (Kb), download (Kb) etc.)



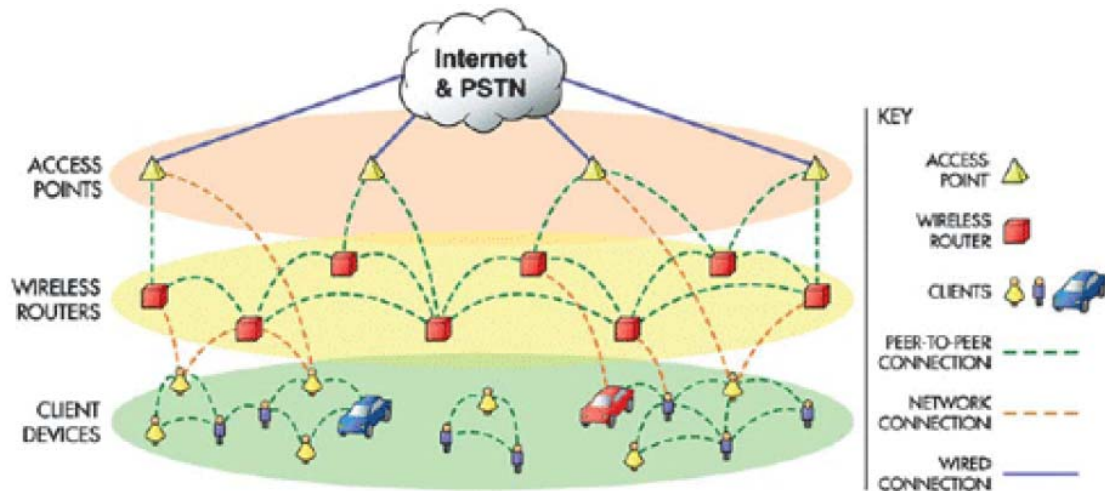
MESH Technology

- Today, wireless links used to connect 802.11 access points (AP) for inter AP communication in mesh networking are vendor specific.
- The proposed 802.11s standard, estimated to be ratified in 2007, will standardize Wi-Fi Mesh networking.
- Intel has unveiled its first proposals for 802.11s for Mesh networking.
- The 802.11s standard will allow access points to become interconnected, without depending on the wired net.
- The Mesh technology is now mainly used in metropolitan areas where it serves as either an alternative for broadband services to end users or is used to create local government networks.
- There are dozens of metro mobile Mesh networks today
- There are only few deployments of mesh network for public access. Only four of existing Mesh networks in Europe that provides public wireless access services.
- The proprietary technology of vendors is more appropriate for public safety than a Wi-Fi only solution, because of their carrier grade technology and the required reliability levels.
- There are two types of MESH network topology:
 - Client Mesh / Mobile Mesh - Every device in the network, including laptops and PDAs can pass along traffic for other devices, which let users “hop” through neighboring devices/ routers to communicate with each other and reach the wired network.
 - Infrastructure Mesh / Fixed Mesh – String together access points. Access points and wireless routers carry the traffic back to the wired network.
- The capacity of the network is constrained by the number of hops in the transmission path.
- The number of flows supported by the network is mostly heavily influenced by the packet sending rate, not by the data rate or packet size.
- Auto-rate adaptation does not always lead to capacity improvement when burst traffic is present.



- Channel capture can result in unfairness among competing flows.
- Packet jitter variations can be significant in current 802.11b networks. Solutions are needed to dampen the variation for real-time traffic delivery.
- RTS/CTS do not typically help in improving performance of real-time traffic.

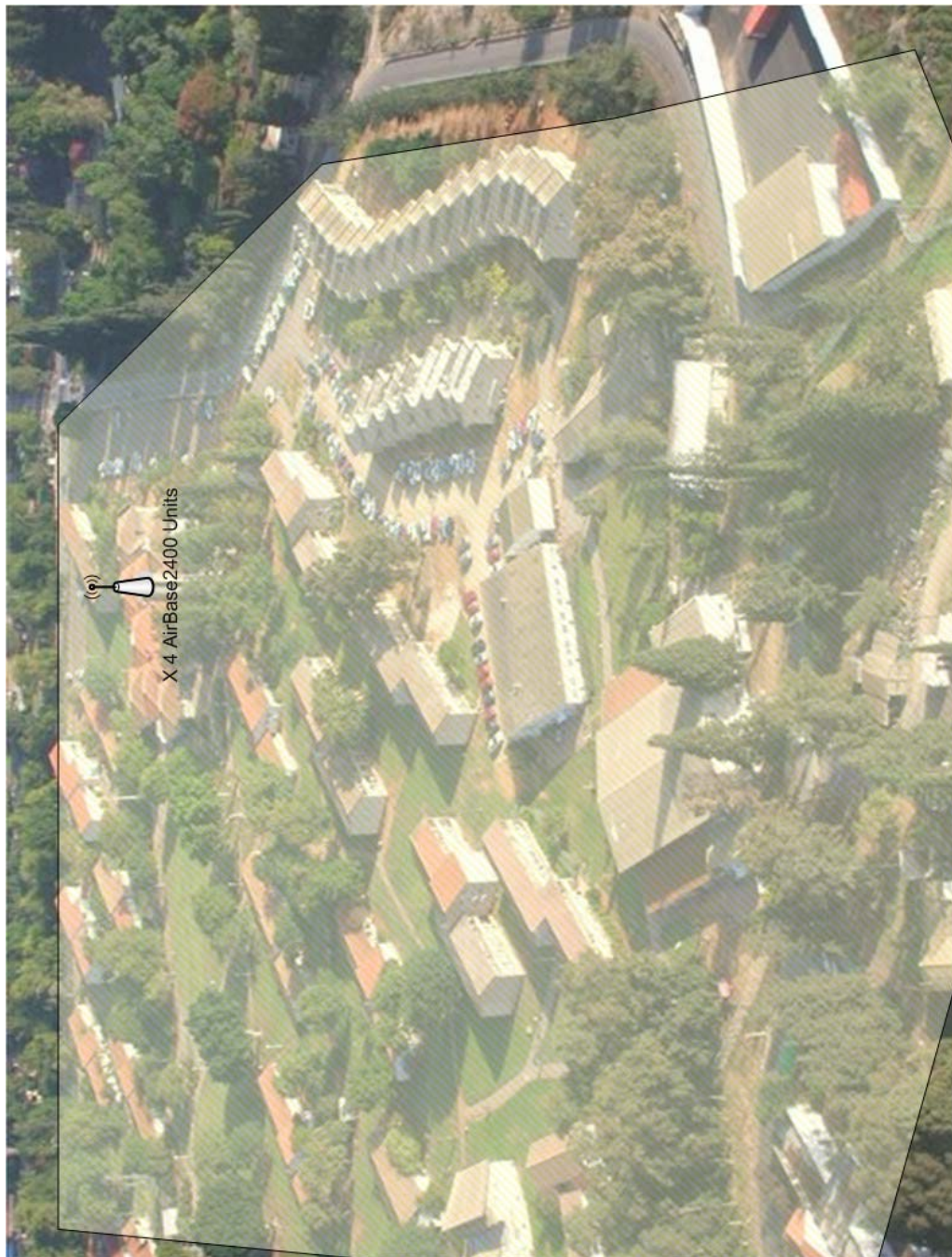
The following figure describes the topology of a standard MESH network, as it is well shown, each user needs to perform several hops in order to receive network services. Each user serves as an access point and shares his computer resources with other network users. The result is simple, it takes a longer period of time for a user to receive a response from the WAN since his way is longer and his resources are shared.



The Campus scenario

The Following figure demonstrates the deployment of the InspiAir system in the campus area. InspiAir uses only **four** Access Points (AirBase2400) installed on the top of the water tower in the campus. The AirBase2400 units allow coverage of the entire area, while maintaining easiness of operation, system control, and very fast installation time.

The system can support up to 200 online users in the campus area, and can be upgraded to support more if needed by adding more AirBase units.



The next figure describes a MESH deployment in the campus.





The mesh network uses backhaul units that interconnect with each other (Marked as **red** AP), and regular APs to allow end users connectivity.

As it is well shown the system contains more units that are deployed all over the campus area.

Deployment, Monitoring, controlling, maintaining and servicing such network is going to be expensive both in material and men power.



Summery:

Deploying a wireless system in any scenario these days requires a meticulous network & channel planning, investment and purchase of huge amounts of equipment and more costly in marinating them operational. Due to the expended covered areas and range, those are significantly reduced using InspiAir system.

InspiAir solution requires none of those; the system is designed to allow maintenance to be done from a central location, the equipment can be easily installed by trained personal, without the need to plan, negotiate with other network owners and the most important thing to return the investment fast.

Further, InspiAir system provides additional capabilities, not in existence in alternative solutions such as indoor / outdoor / transition environments, full mobility up to highway driving speeds (100 Km/H), etc.