A CDM Wireless White Paper

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Wireless Network Solutions
Point to Multipoint (PtMP) vs. MESH

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Introduction

CDM Wireless, a provider of innovative wireless solutions, in our desire to educate and keep our customers abreast of our progress, is distributing a new series of white papers focusing on the basics of Wireless and Wi-Fi systems.

This particular issue will provide our distribution, integration and end user partners with a better understanding of the differences between a Wireless Point to Multi Point (PtMP) network and a MESH installation.

Problem Statement

Recently it has become commonplace for bid proposals for wireless infrastructure to include a specification requiring the use of a wireless MESH product. This often happens regardless of any insight into how the functionality of MESH will affect the performance of a specific system.

It has become clear over the past several years that the Wireless "MESH" has become a buzz word as the one wireless solution for most everything. CDM Wireless takes a different approach to this issue.

There are some situations in which MESH will outperform a PtMP solution, but those cases are rare when it involves a bandwidth demanding video surveillance component.

A Tale of Two Designs

We will endeavor to present the two technologies in a point-counterpoint discussion so it can be seen why one technology would be chosen over another in a given situation.

Video Surveillance

The Point to Point (PtP) and Point to Multipoint (PtMP) design basics allow for dedicated wireless paths between two or more remote locations back to the Access Point.
This approach to wireless technology has many benefits that are quickly observed in the wireless video industry.

Pre-determined routes for packet forwarding allow video packets to arrive faster, and in order, which

will minimize pixel artifacts in the decoded video stream.

This technology minimizes the number of wireless network devices needed to complete a job. For our down channel partners, knowing when to utilize PtMP can save everyone in the supply chain time and money.

It is true that the wireless MESH approach will provide multiple redundant paths for video transmission but there are some caveats that the end user must be aware of.

For one, the MESH controller must create and constantly update what is called a forwarding database. This database contains a matrix of every possible route a packet could traverse through the network and then decides, based upon link performance and packet metrics, how the packet should progress through the system. These control mechanisms require CPU cycles and memory and as a result the hardware for a portal needs to be more robust. This in turn can raise the cost of a controller unit or, in the case of some manufacturers, requires an additional piece of hardware for each installation.

Another drawback to utilizing MESH in a video surveillance environment could be the cost of deployment. For a MESH network to do its intended job of letting client devices roam freely between access points, it must have sufficient coverage so that at any one time a client device stays connected to multiple access points simultaneously. This ensures that if a client moves out of range of an access point (a Pico-cell) it will still maintain contact with at least one other AP thereby keeping the client from dropping packets between changes.

This sounds like the kind of performance you want in your network, and that is often how it is sold to the end user. The often disregarded information about this process is that all of these changes to the layer-2 fabric and the layer-3 routing can wreak havoc on the transmission order of your video packets.

UDP packets have no error re-transmission, and at times they are either never decoded or decoded improperly causing a potential loss of critical video data. UDP frames will often fail to arrive intact as the packet is split between the path changes.

TCP packets, which do have error correction and retransmission, can begin to slow down the process of decoding video as the packet has to be retransmitted until it arrives intact. In a network with many changes this can significantly deteriorate the performance of the network.

These side-effects can be minimized by path prioritization and selective path elimination techniques and/or algorithms. This is often necessary after deployment when the network won't function as sold. After making these changes to the video network, it starts to function properly and you end up with a sound, viable Point to Multipoint wireless network which was originally purchased as a MESH solution.

Mobile Connectivity & Dynamic Placement

The MESH wheelhouse, Mobile Connectivity & Dynamic Placements, is one section of the market where MESH can put a PtMP network to shame. There are times in the wireless industry when the timeliness of video delivery outweighs the need for high quality delivery.

Consider a portable camera platform that can be deployed at a moment's notice and with very little effort. This could be anything from a sporting event to an emergency monitoring network for a disaster area. The controller can be placed on a command vehicle and the camera platforms can be placed around the area where they will be most effective.

Likewise there are times when the receiving target of the video has to remain fluid and move easily through an environment all the while maintaining a connection to a video source.

Think about a security patrol vehicle moving about a campus and constantly keeping an eye on the NVR at the head end of a network.

Wireless MESH was designed for these kinds of environments and can function nicely while performing these tasks.

Ideally a Wireless MESH network consists of multiple low use clients which can be freely moved about a coverage area while maintaining continuous connectivity.

CDM Solutions

CDM considers both PtMP and MESH network types to be viable when correctly deployed for the applications in which they excel.

This is one of the reasons why, starting in 2012, we are integrating both technologies into our wireless platform by default. Previously CDM marketed two separate lines of equipment the Viper (PtP/PtMP) or the Cobra (MESH) products.

While both lines have been successful in their own rights CDM felt that it was time to merge to two lines and move forward focusing not on methodologies of wireless deployment but the technology that supports them.

Our 2012 product line now includes 802.11n technology by default allowing our products to provide 150 to 300 Mbps of data throughput in either PtP/PtMP or MESH configurations.

CDM Wireless's customized product lines can combine multiple mode radio modules across a selection of bands for a project specific Wi-Fi deployments, capable of operating in the most demanding of environments.

Implementation

All that is required to implement a CDM Wireless network are the same procedures our business partners have used all along. CDM will perform any programing and performance testing of the system before we ship it and after it is deployed to make sure that it is performing to the manufacturer's specifications. With cooperation and input from the integrator/end user CDM can fine tune the programing of our equipment so that it melds seamlessly with any preexisting infrastructure as well.

Summary

By utilizing a CDM Wireless solution and relying on our experience and expertise in the wireless industry, we can provide our customers with a unique and scalable wireless environment making sure our customers benefit in the process.