

MotoMesh Solo Network Upgrade to 802.11n with Intelligent Endpoints

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1. Introduction

In 2011 3D-P introduced to our customers the 802.11n equipped Intelligent Endpoint product line, along with the Motorola 7181 802.11n Access Point and the e57 Dual Radio Intelligent Endpoint. The combination of these products can provide mobile networks with data rates up to 300Mbps, and complete mine-wide coverage. In order to achieve these benefits, a complete re-design/new deployment of the networks wireless infrastructure is required.

The upgrade path to such an infrastructure can be considered a process, and completed in a manner as to reduce the impact on clients currently using the wireless network. This is a multi-stage process with varying configurations of both the network infrastructure and client radios during the upgrade.

2. The objective, a network with both high throughput and availability

In order to obtain the high throughputs available from an 802.11n outdoor network, the infrastructure must be deployed within the guidelines of a careful network design. Zones of coverage must be designed and created in order to allow each client a clearly chosen AP to communicate with. Overlap from other zones must be reduced or eliminated in order to reduce the noise floor and ensure minimal dropped packets from interference. This is done through the proper deployment of mobile access points, power settings on the access points, utilizing terrain shadowing, and proper antenna selection, to include electrical down tilt. It is also very important the client devices in the network utilize proper antennas. Utilizing high gain antennas on clients can have adverse effects as it increases the

noise to other Access Point zones. Reference the 3D-P Document “112911-Network Design” for more information.

3D-P’s 802.11n network designs include the Motorola 7181 Access Point. The 7181 has some highly desirable features available to outdoor networks. First, the radio has the capability of allowing the user to control the output power, as well as utilizing electrical down tilt. Both features allow the user to create appropriate coverage zones within a network. The 7181 also incorporates the Adept™ antenna system which makes 802.11n dual data streams possible in an outdoor environment with limited multi-path. Even with these technical advantages, obtaining a high throughput network with a high percentage of coverage is only possible through proper network design and deployment.

3. The upgrade path

Where there is an existing MotoMesh Solo network it can be advantageous to upgrade the network over time, minimizing the downtime to the clients. During the upgrade, the following tasks must be accomplished:

1. Create a Channel for the 802.11n network to utilize interference free from the MotoMesh Solo network.
 - a. Ex. Change the MotoMesh Solo Control Channel to Channel 4, and Block channel 1 on all Moto Mesh equipment.
 - b. Configure all 802.11n equipment to utilize 802.11n channel 1.
2. Deploy the 802.11n network utilizing coverage zones.
 - a. Coverage and throughput priority are given to areas with Semi-mobile equipment such as Shovels and Drills.
 - b. At this stage, the network must be deployed on a single channel. When the upgrade is complete, the network can be improved to obtain higher throughput and better separation of zones through the use of multiple channels, and proper coverage zone design.
3. Deploy e57 Intelligent Endpoints (IEP’s) on Shovels and Drills.

- a. The 802.11n client card communicates to the new 802.11n infrastructure.
 - b. The Solo card is configured as an Access Point for the remaining trucks and support equipment still utilizing MotoMesh Solo.
 - c. This step increases overall network throughput by putting Shovels and Drills on the 802.11n network, which has high throughput, and removes this throughput load from the Solo network, allowing the trucks to realize additional available throughput.
4. Reduce existing Solo Infrastructure as required in order to utilize the new e57 Solo APs on Shovels and Drills.
- a. Shovel pits, etc. will now be provided Solo coverage from the e57 on the Shovel. It may be possible to reduce the Solo network infrastructure at this time.
5. Replace all MotoMesh Solo Clients on Trucks, etc. with 802.11n equipped IEP's.
- a. This step can be performed over time.
 - b. Additional channelization may be performed during this time, ie. if there are only a few Solo Clients, or small amount of Solo throughput required on the network, it is possible to block Channel 2 of the Solo network, and utilize 802.11n channel 6 in some areas of the pit for the 802.11n network.
6. When all Solo clients are removed, remove all remaining Solo Infrastructure.
- a. Disable the Solo cards on the e57's.
 - b. Re-design the coverage zones of 802.11n network utilizing proper channelization.
 - c. This step again improves overall network throughput.

It is important to note that during the period of time when the new 7181 (802.11n) network is deployed, and the MotoMesh infrastructure is still in place, the number of available channels to both network is reduced. This results in the overall performance of both networks being slightly degraded. However, the throughput of clients within the network is being managed in

such a way that the Clients will realize additional throughput availability from the beginning of the upgrade. It will be necessary throughout the upgrade process to remember the importance of channelization, and continuously adjust the network to take advantage of additional channels as they become available.

4. Summary

Upgrading your existing wireless network to a higher throughput capable 802.11n mobile network is now possible, through the use of the 3D-P Intelligent Endpoint, and Motorola 7181 802.11n Access Point. Following the procedures outlined in this document can make the upgrade a manageable process, with limited downtime.