



Third-Generation Structured Mesh™ for Military Environments

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- ❑ What Makes Military Environment Different
- ❑ What Makes Third-Generation Different
- ❑ MeshDynamics Product Offering
- ❑ Homeland Security Trials
- ❑ Military Field Trials
- ❑ Hybrid Mesh Framework

- ❑ Deployed combat environment, not enterprise or municipality
- ❑ Coordinated mesh networks optimal
- ❑ Distributed channel agility critical
- ❑ Maximum hop capacity for lower cost, ease of deployment, survivability

- ❑ Resistance to jamming / inadvertent interference
- ❑ Dynamic, adaptable for mobile deployment
 - Hybrid mesh capabilities
- ❑ Low latency and jitter for real-time performance
 - Video, voice

- ❑ Multiple mesh vendors for sensor nets, force protection, etc. create challenges
 - Channel interference
 - Management
- ❑ Coordinated mesh networks supporting multiple applications are synergistic
 - Each node added improves performance overall, adds survivability

- ❑ Unlicensed spectrum
 - Inadvertent and malicious interference
 - 802.11a backhauls -- more channels, fewer interfering sources
- ❑ Near-instantaneous meshing of mobile nodes needed without configuration
- ❑ Requires distributed “radio robot” for channel agility

- ❑ Minimizes Ethernet drops, attendant costs
- ❑ More survivable in emergencies
- ❑ Easiest to deploy with less pre-engineering
- ❑ Best coverage of large unwired areas
- ❑ Most flexibility for mobile node deployment
- ❑ Proven high performance in USAF tests

- ❑ Higher-performance solution offers headroom for future applications without forklift upgrade
- ❑ Primarily software-based, mainly COTS hardware
- ❑ Multi-hop capacity minimizes disruption of existing wired networks -- fewer drops

- ❑ DHS / Border Patrol (SPAWAR)
 - Mobile nodes, many hops
- ❑ USAF Force Protection BattleLab testing
- ❑ Naval Postgraduate School, Monterey CA
- ❑ COAST testing, trial deployment CA and Thailand
- ❑ In-theater extended mobility trial in Iraq (Shotspotter)

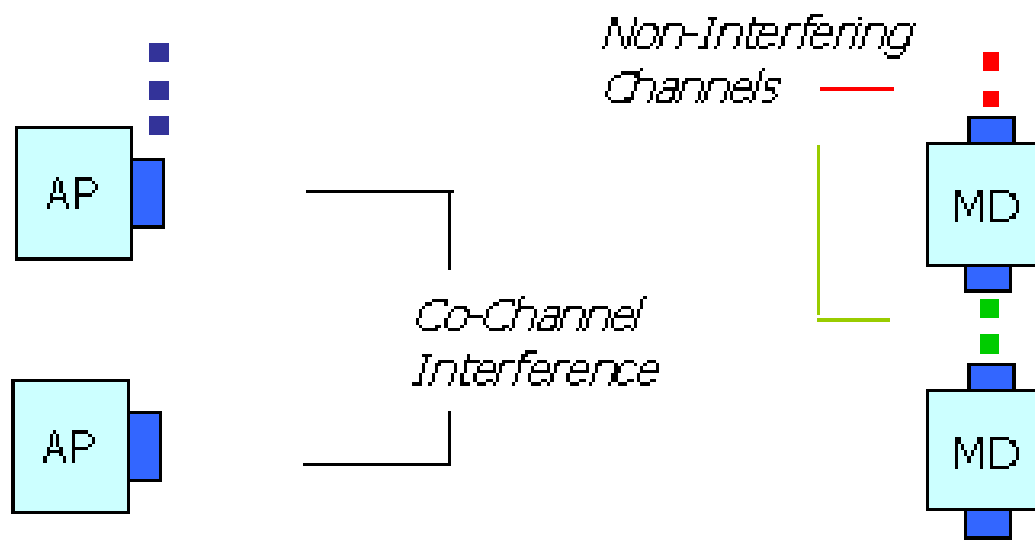
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One Radio Backhauls run out of steam

1-Radio Backhaul Cannot Send/Receive Simultaneously

Single Radio Backhaul

Multi Radio Backhaul

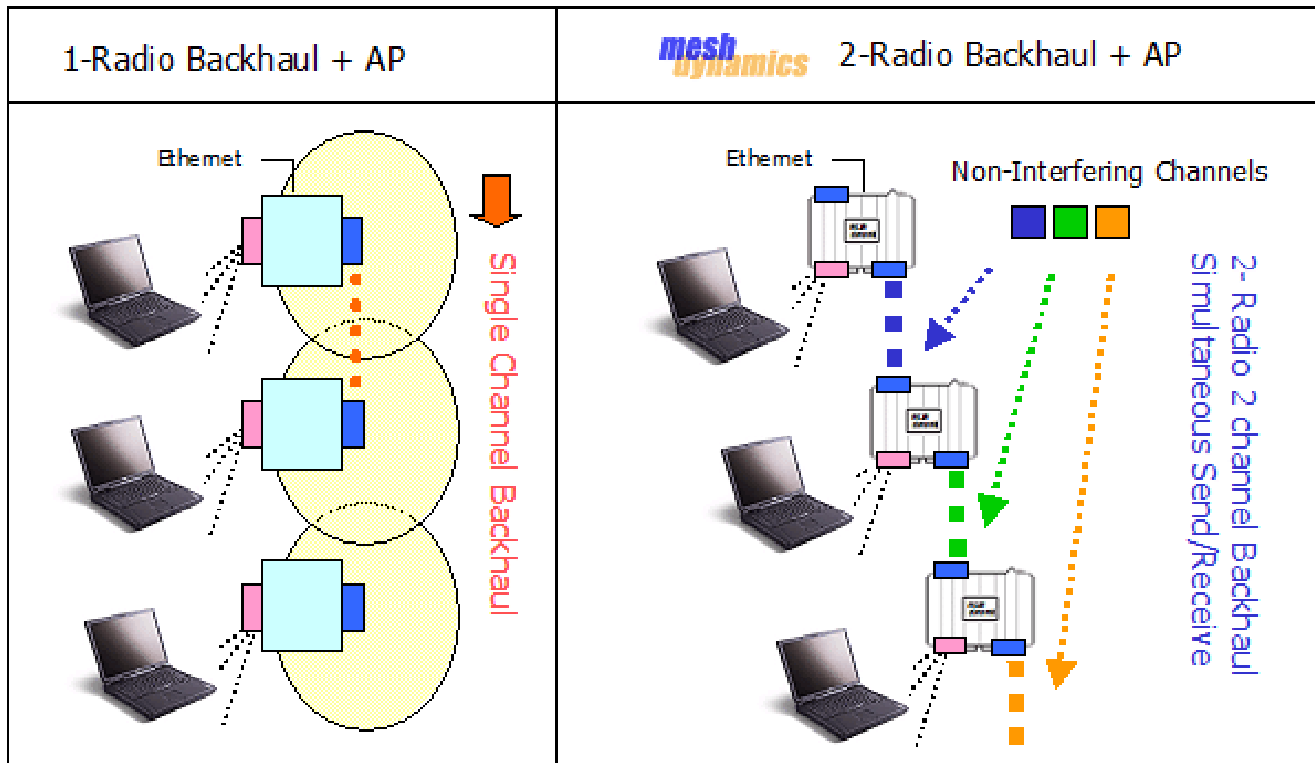


Step 1. Receive Packet
Step 2. Send (on same radio)

Simultaneous
Receive/Send

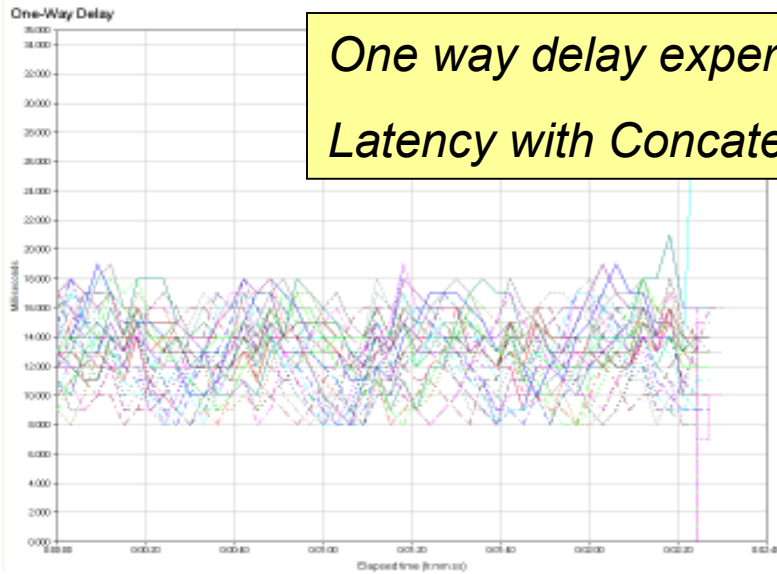
■ Mesh Backhaul Radios

Structured Mesh has a Multi-Radio Backhaul

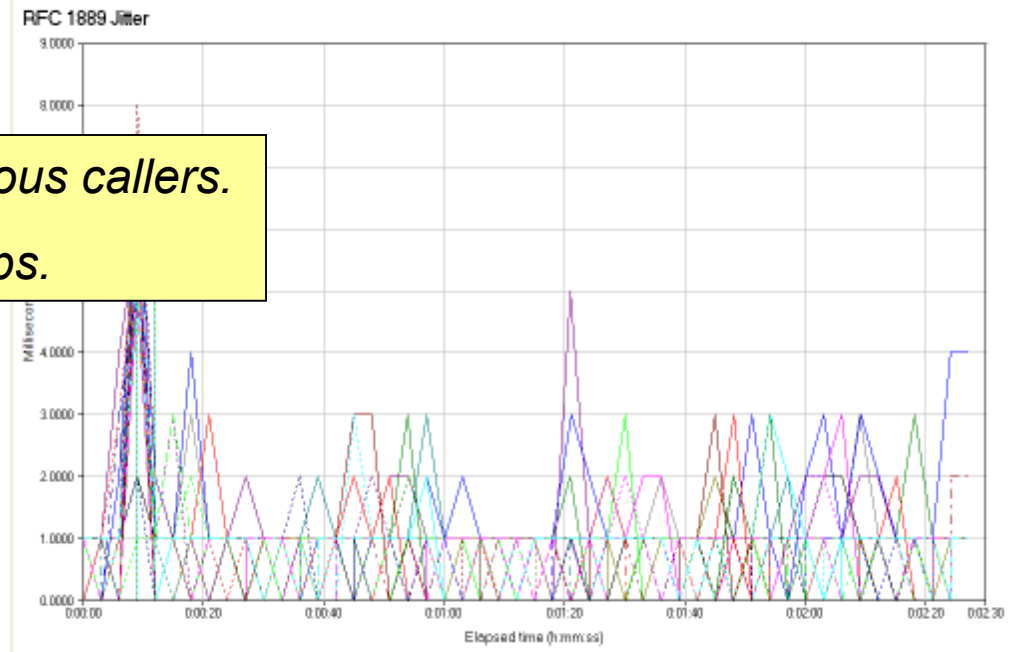


Controlled Latency and Jitter (VOIP)

*One way delay experienced by the 36 simultaneous callers:
Latency with Concatenation is 10 ms + 1 ms per hop*

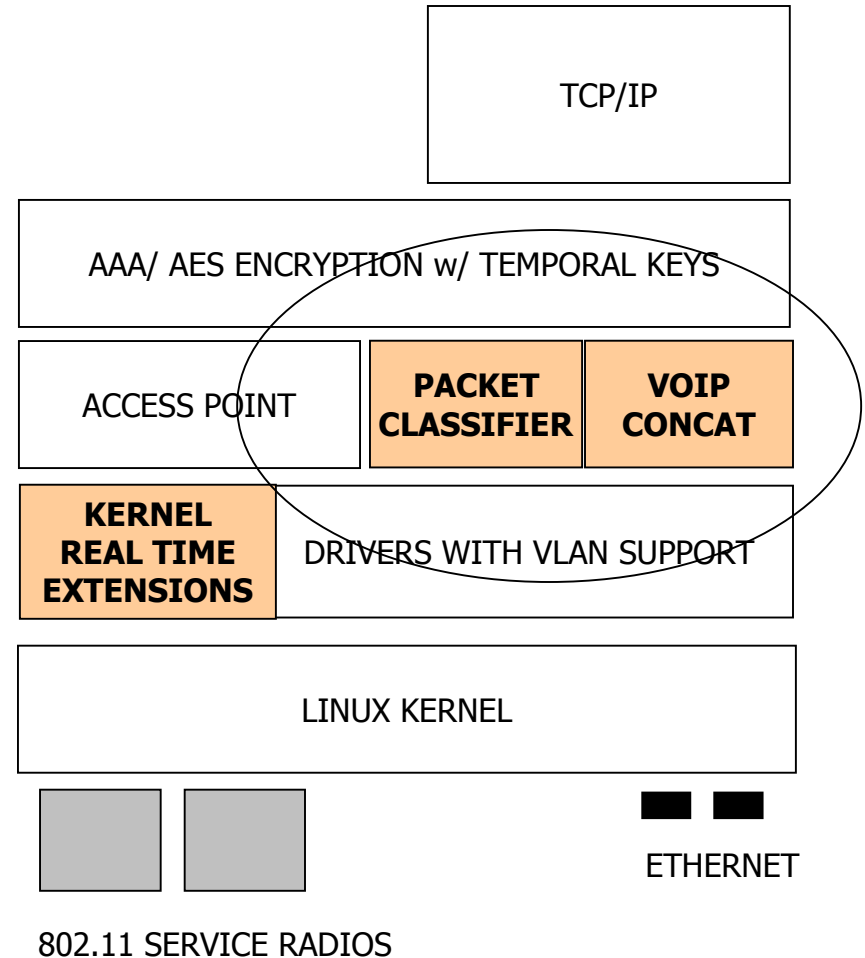
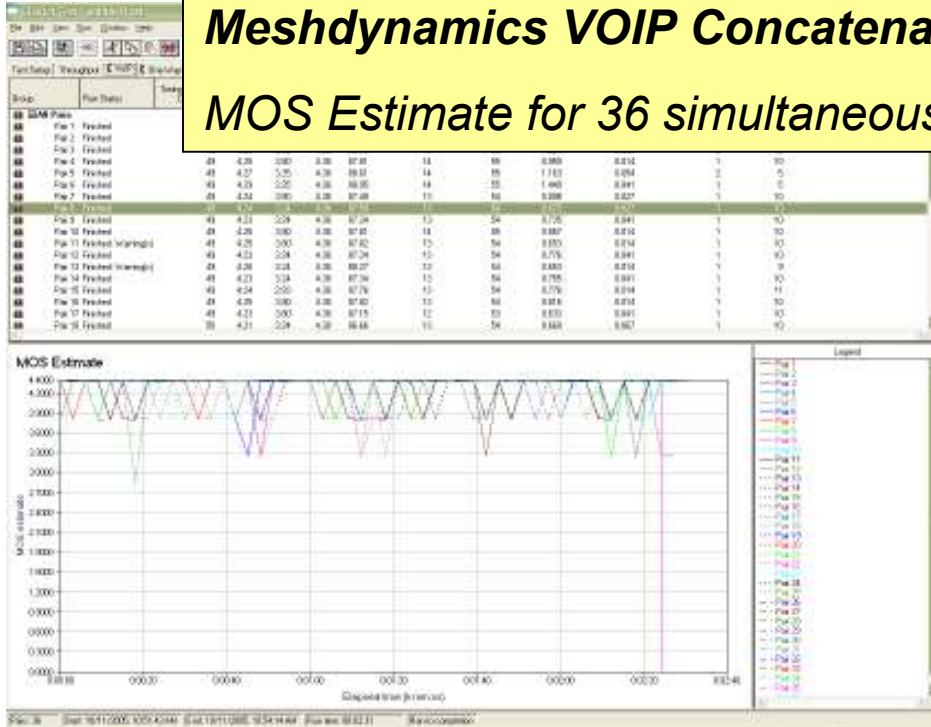


*Jitter experienced by 36 simultaneous callers.
Less than 4 ms average over 4 hops.*



Controlled Latency and Jitter (VOIP)

Meshdynamics VOIP Concatenation Engine:
MOS Estimate for 36 simultaneous calls over 4 hops



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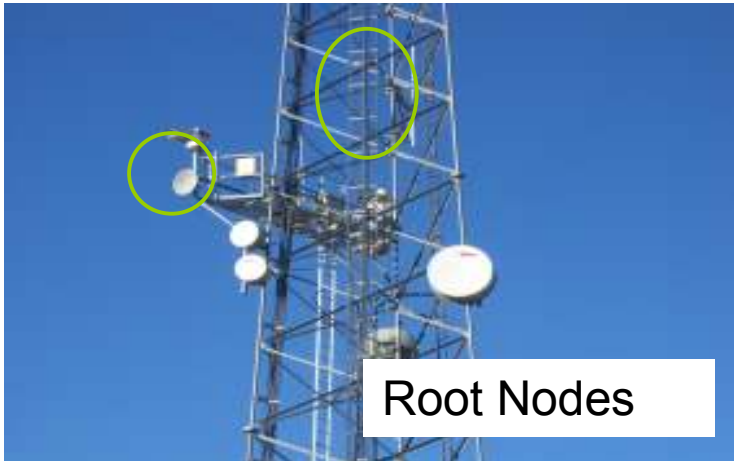
4 N-Female Connectors, 2 Ethernet Ports
Module Dimensions: 8" x 6" x 2", 3.0 lbs

Top: 2 N-Female connectors to Antennas



Bottom: 2 N-Female, 2 Ethernet Ports with POE

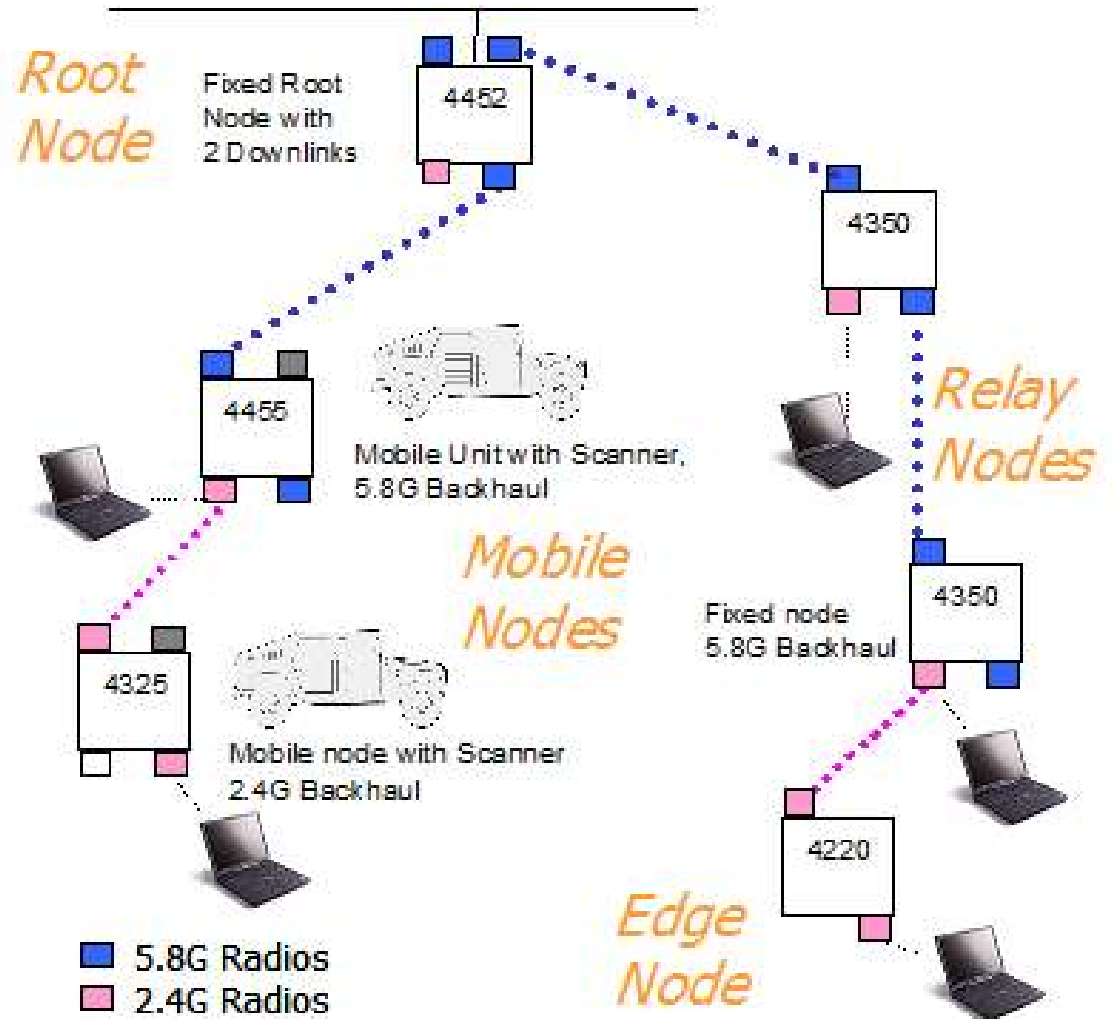




Root Nodes



Mobile Node



MeshDynamics Network Viewer 7.0

File Edit Run View Help

Properties

Property	Value
Name	meshap
Description	< <enter description.
Latitude	0
Longitude	0
Hardware Info	
Firmware Version	2.209.0
Model Info	MD4350-AA-G
Mac Addresses	
Unit	00:12:ce:00:08:a8
ixp1	00:12:ce:00:08:a9
wlan0	00:12:ce:00:08:aa
wlan2	00:12:ce:00:08:ac
IP-Settings	
HostName	meshap
IP Address	192.168.0.100
SubNet Mask	255.255.255.0
Gateway	192.168.0.1
Information	
Heartbeat Count	231
Parent Signal Strength	29
Known AP's	1
Uplink TX Rate	54
Hop Count	1
Mesh Settings	
HeartBeat Interval	15

default x

HeartBeat Group Selection Station Activity

No	MacAddress	TimeStamp	STA Address	Status
1	00:12:ce:00:0a:52	Mon Oct 03 13:43:06 PDT 2005	00:12:f0:4d:76:e1	Disassociated
2	00:12:ce:00:08:06	Mon Oct 03 13:43:13 PDT 2005	00:12:ce:00:09:7a	Associated
3	00:12:ce:00:08:12	Mon Oct 03 13:43:15 PDT 2005	00:12:ce:00:08:a8	Associated
4	00:12:ce:00:08:12	Mon Oct 03 13:43:15 PDT 2005	00:12:ce:00:0a:52	Associated
5	00:12:ce:00:08:a8	Mon Oct 03 13:46:05 PDT 2005	00:12:ce:00:09:7a	Associated
6	00:12:ce:00:09:7a	Mon Oct 03 14:40:00 PDT 2005	00:12:ce:00:09:74	Associated
7	00:12:ce:00:09:74	Mon Oct 03 14:53:04 PDT 2005	00:12:ce:00:09:7a	Associated

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Douglas Arizona. Border Security



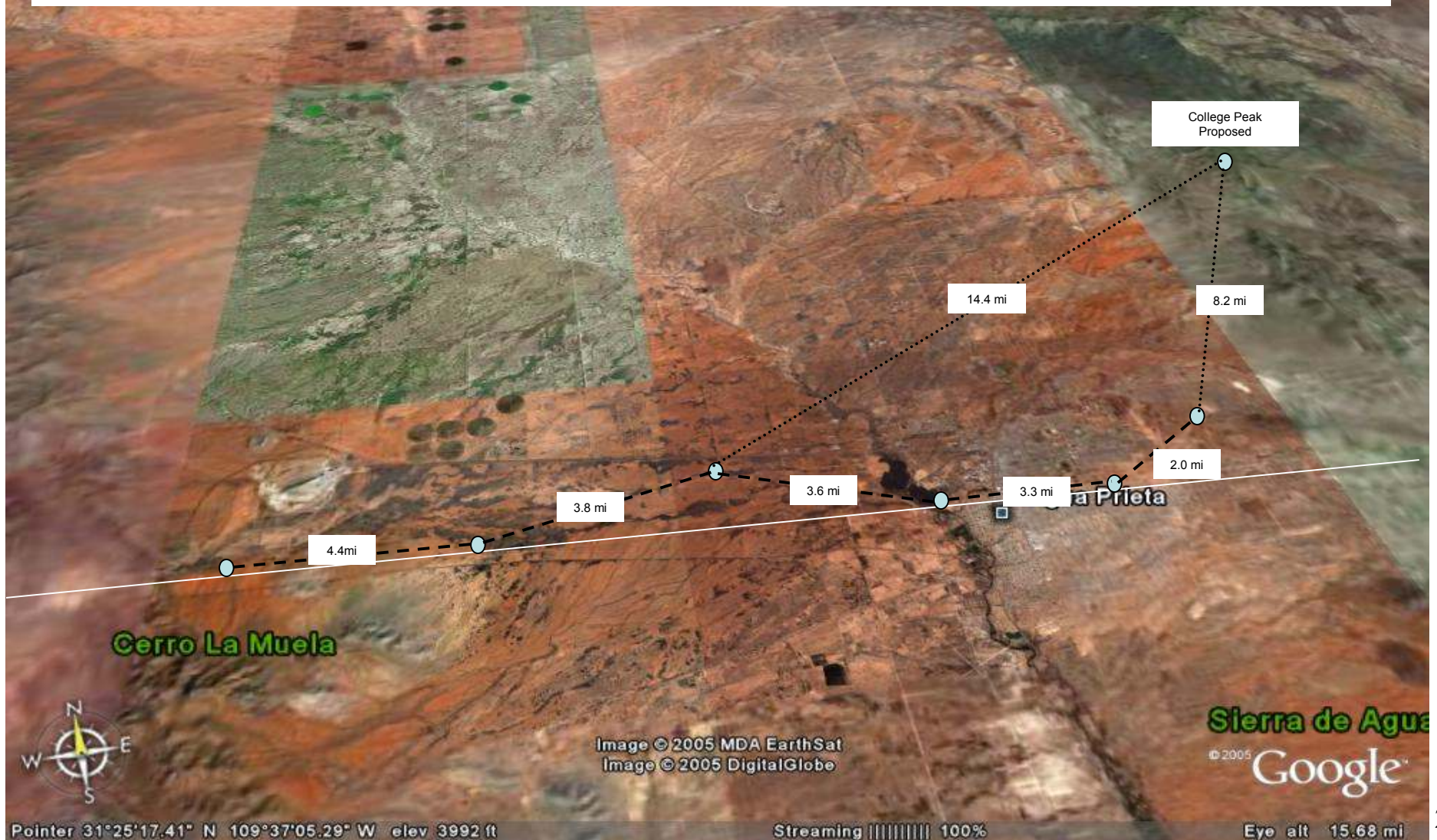
Douglas AZ

6 stationary MD4350-AABx-1100, 4 mobile MD4220-BBxx-0000

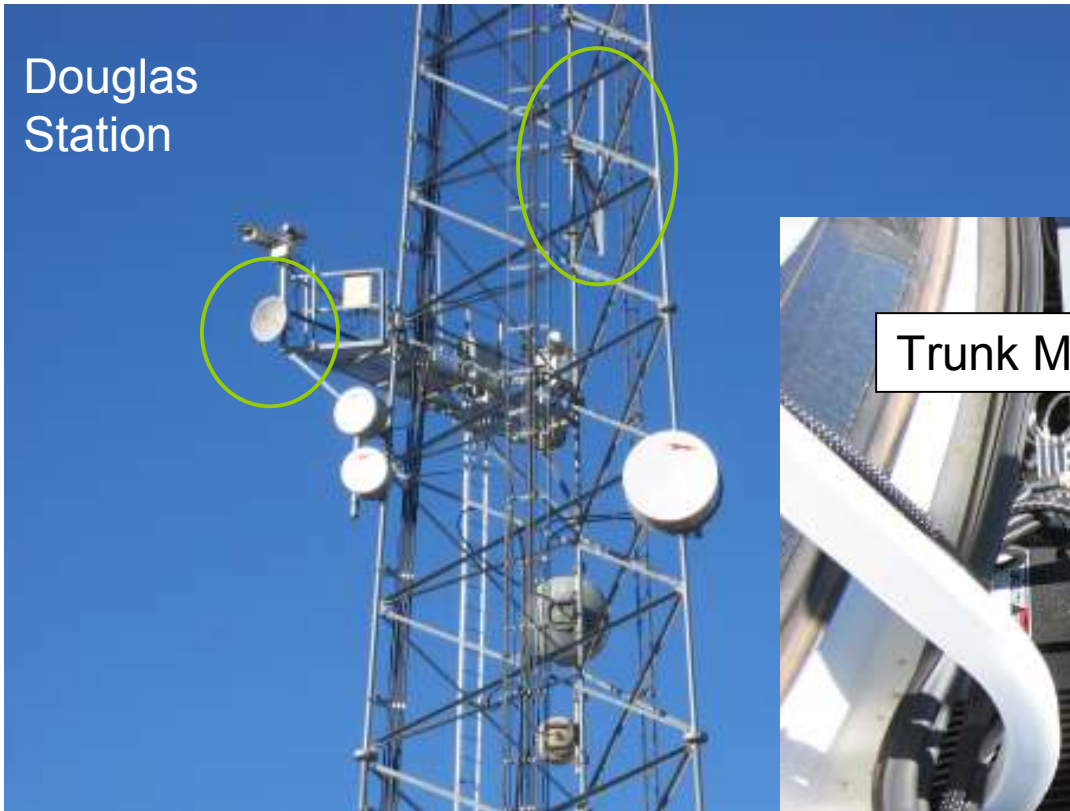
Backhaul using 29dbi Hyperlink Parabolic Antennas (HG5829d) with UBNT radios, no amps

Backhaul transmit rate is 54Mbps on all links. Throughput is 20Mbps.

SPAWAR has tested a 14mi link that maintained the 54Mps transmit rate.



Douglas
Station

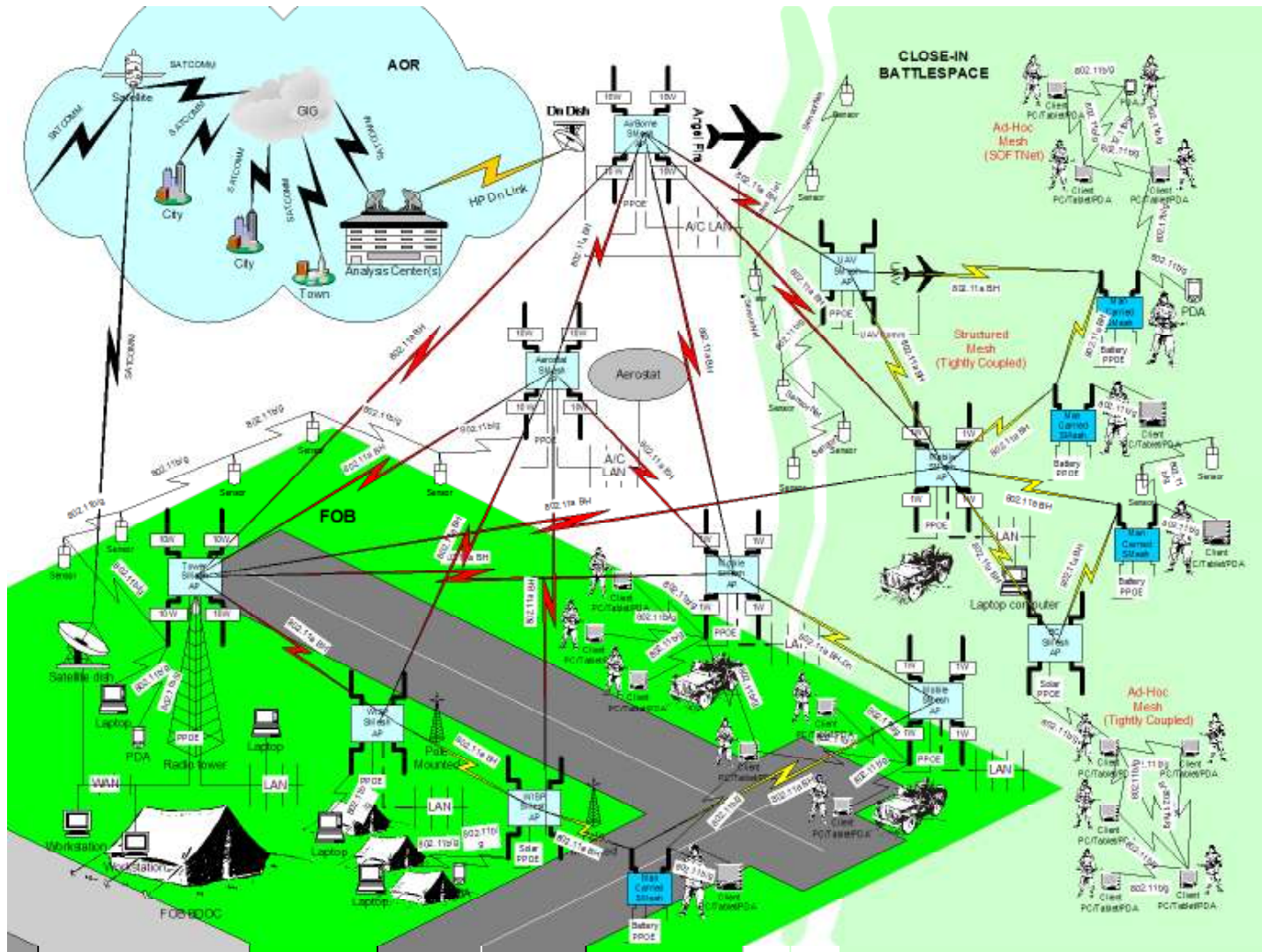


Trunk Mounted Unit (Mobile Unit)

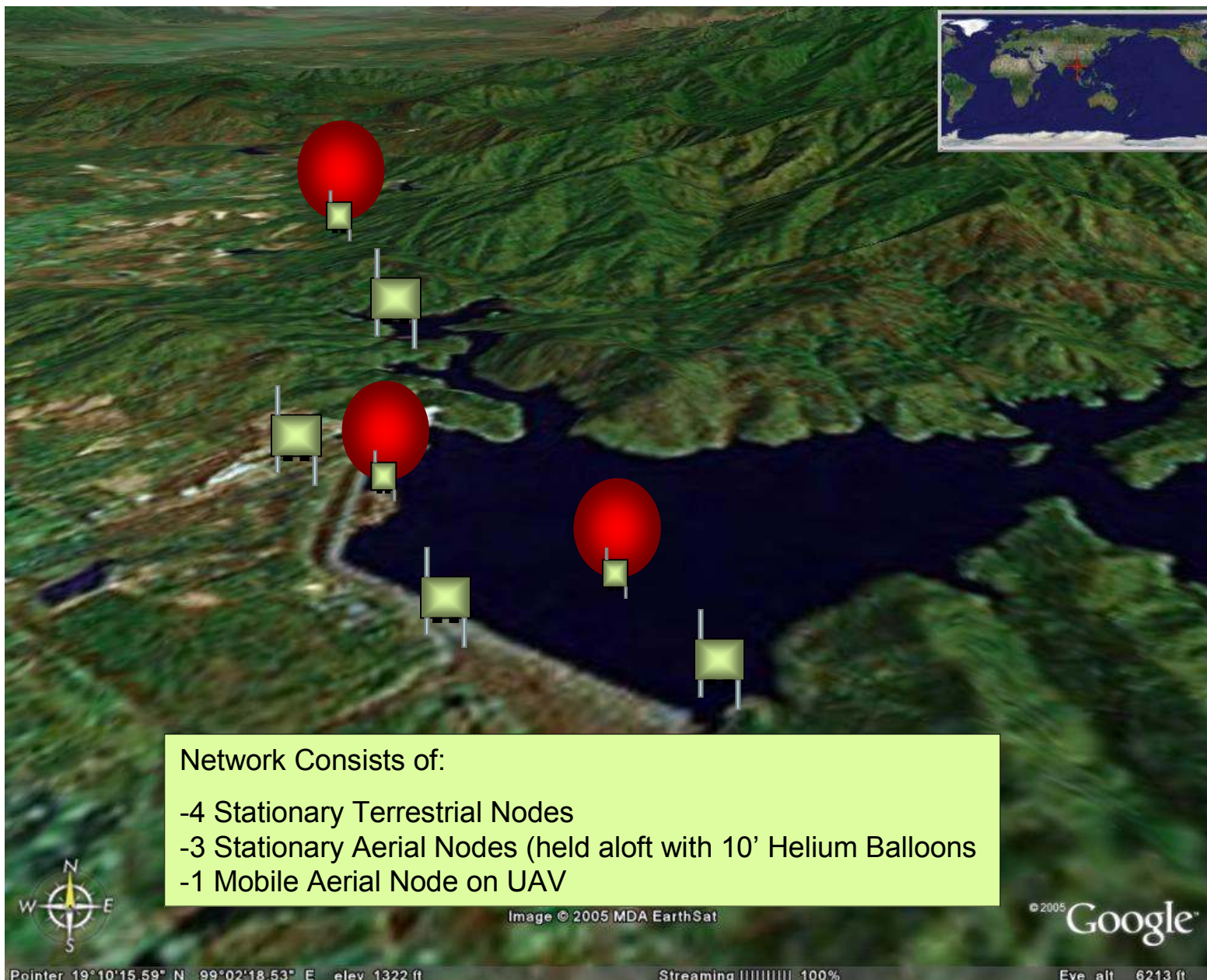


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Robust Wireless Network Concept



Courtesy: Curtis White at Force Protection Battle Labs, Lackland AFB, San Antonio, TX






Live view - AXIS 213 PTZ Network Camera version 4.03 - Microsoft Internet Explorer presented by Comcast

File Edit View Favorites Tools Help

Address http://12.155.12.133:1751/view/index.shtml Go

Live Feed over a 9 hop mesh network



Up
TILT
Down

The AudioComponent that enables streaming video in Microsoft Internet Explorer, could not be registered on this computer. To install AXIS Media Control, you must have administration rights on this computer and you must answer Yes when asked if you wish to allow the installation. The AXIS 213 can also be configured to show still images.

Click in image movement: PAN Left Right Home
Absolute IRIS Close Open Auto iris
FOCUS Near Far Auto focus
ZOOM Wide Tele

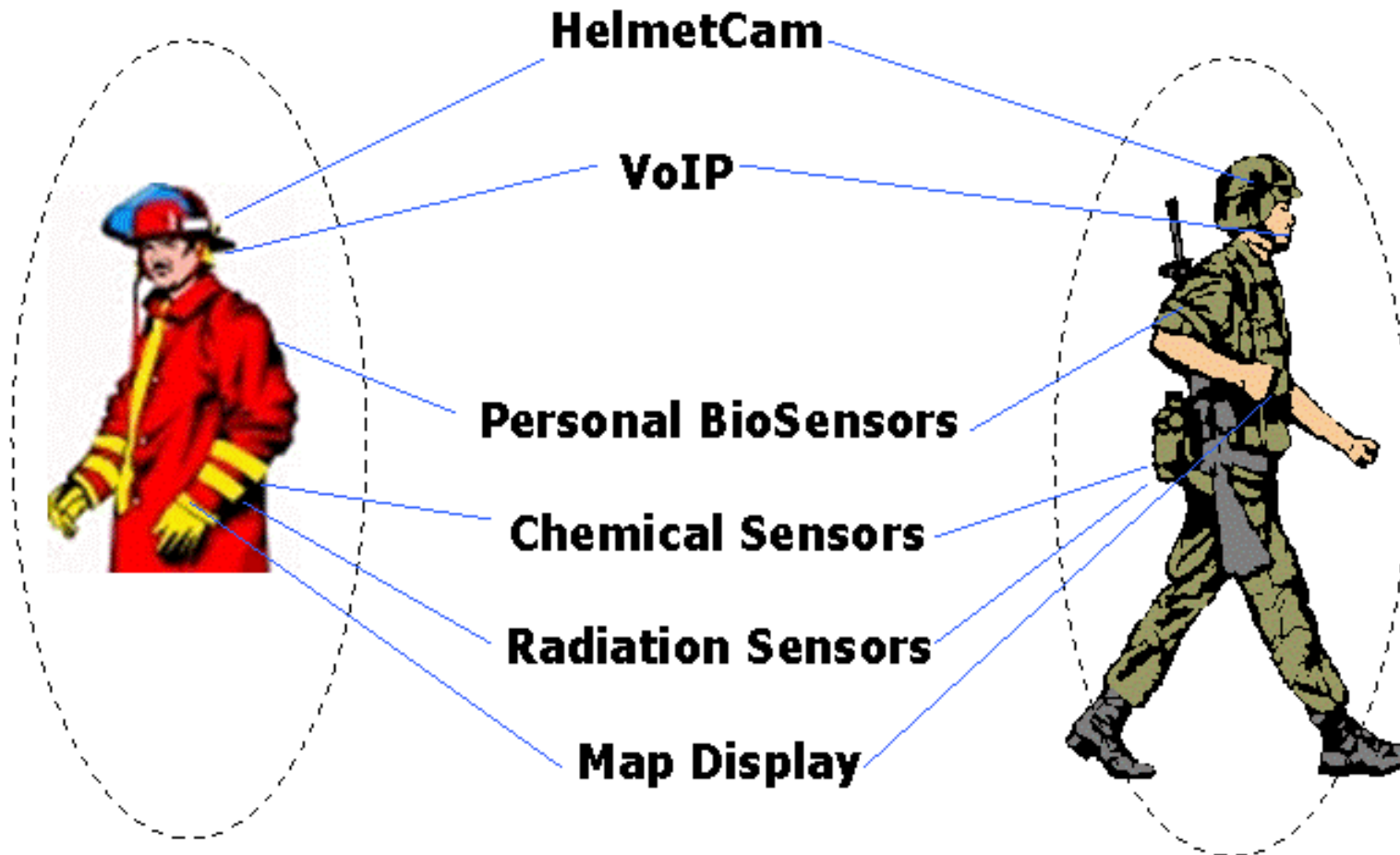
Remote Controls

PTZ Control Queue

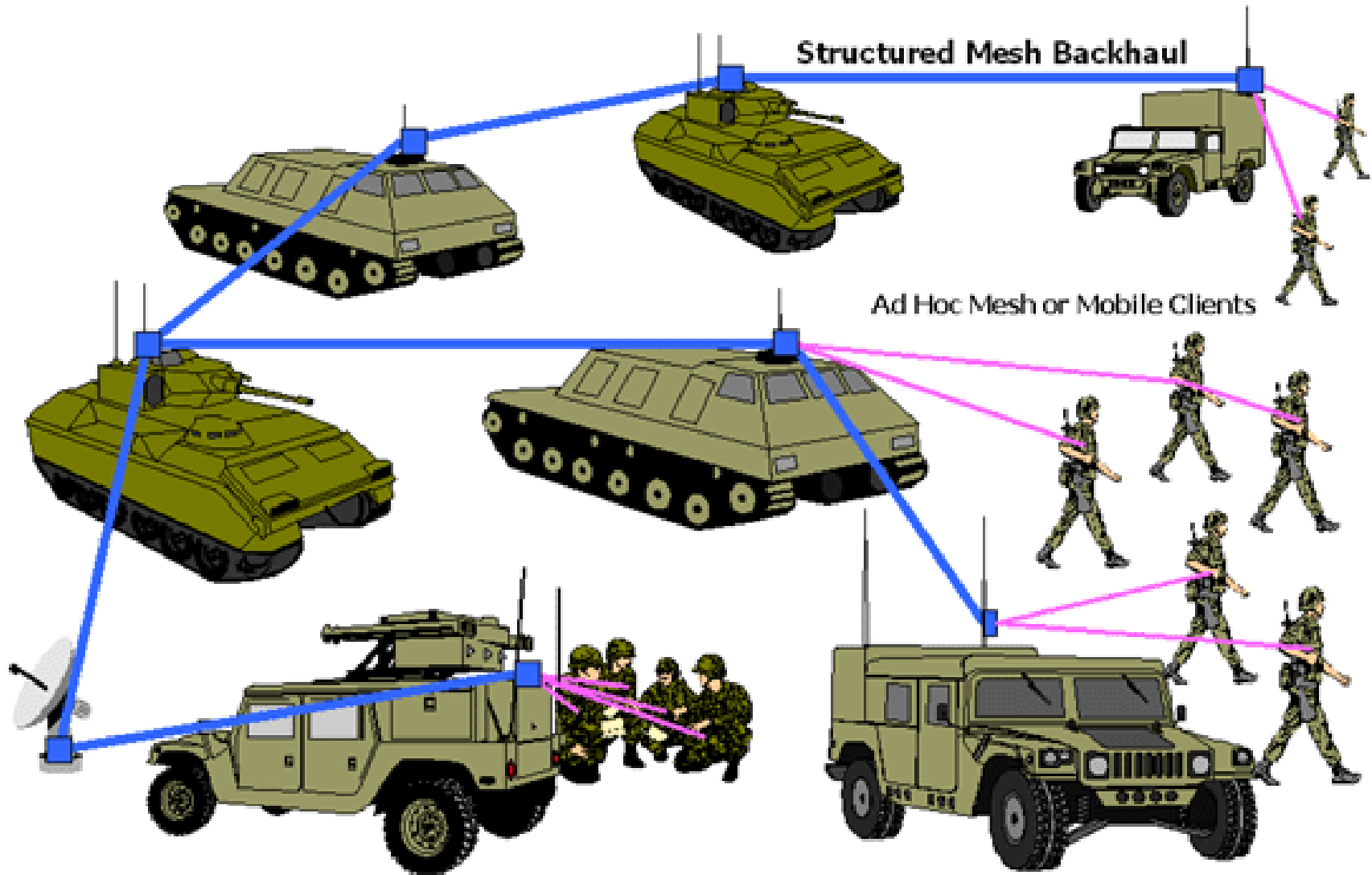
Status in queue: Not in queue Position in queue:

Time remaining: seconds

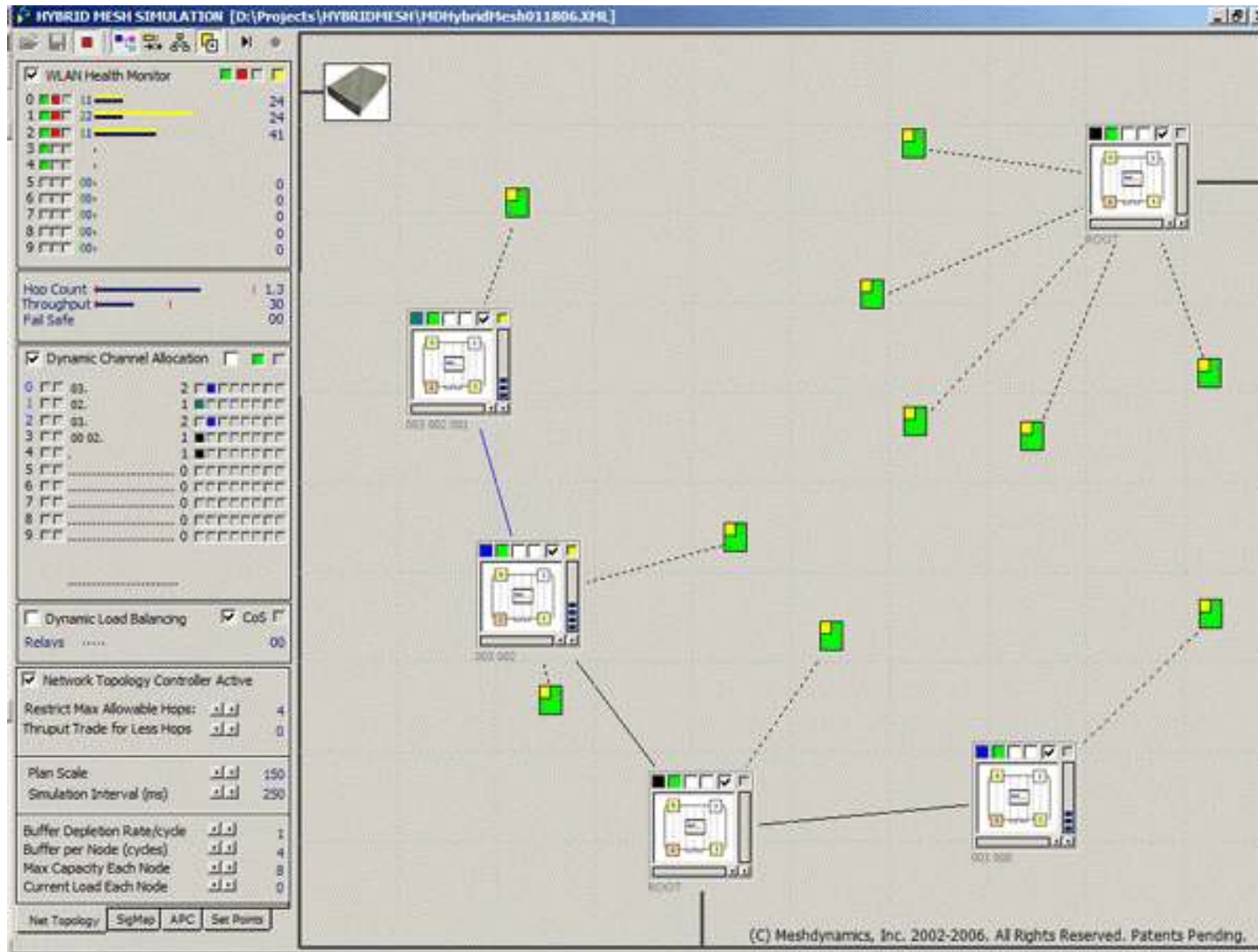
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Hybrid Mesh: Always Connected



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