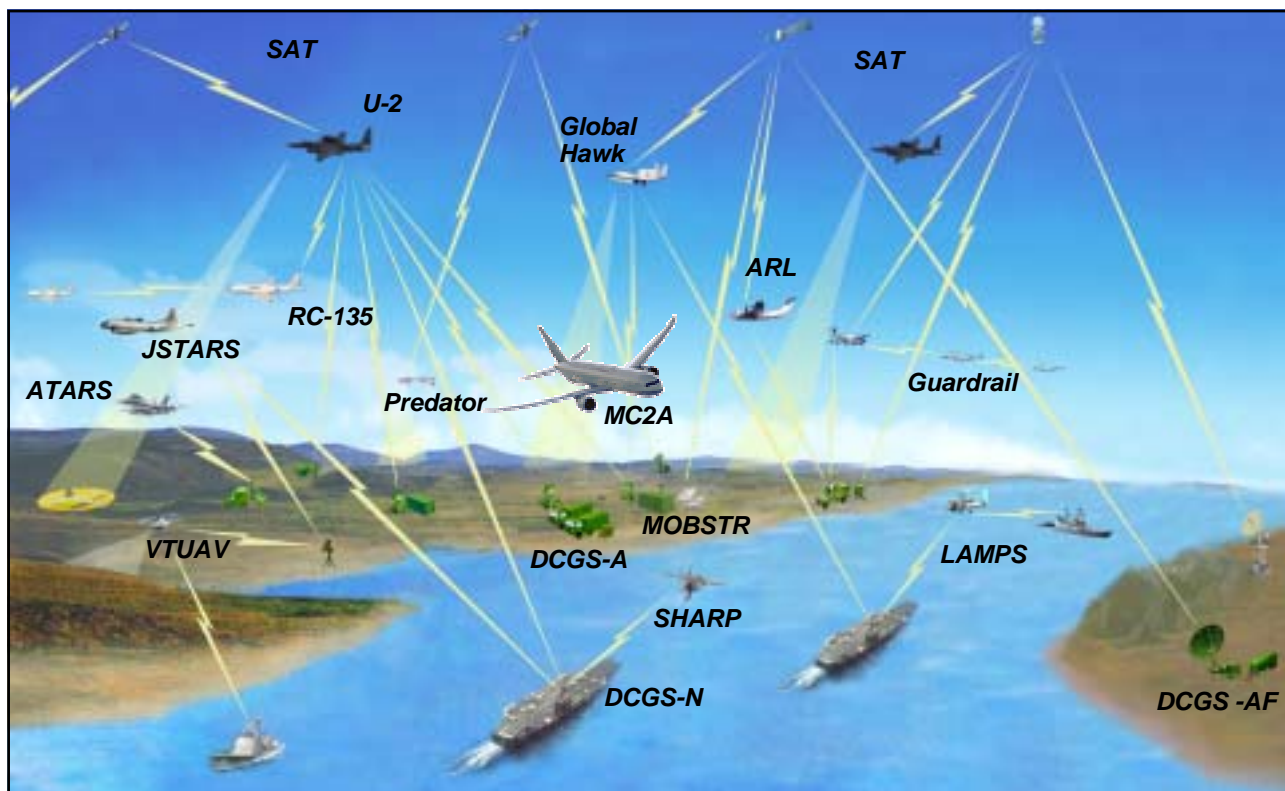# Case Study –
Mobile Military Networks
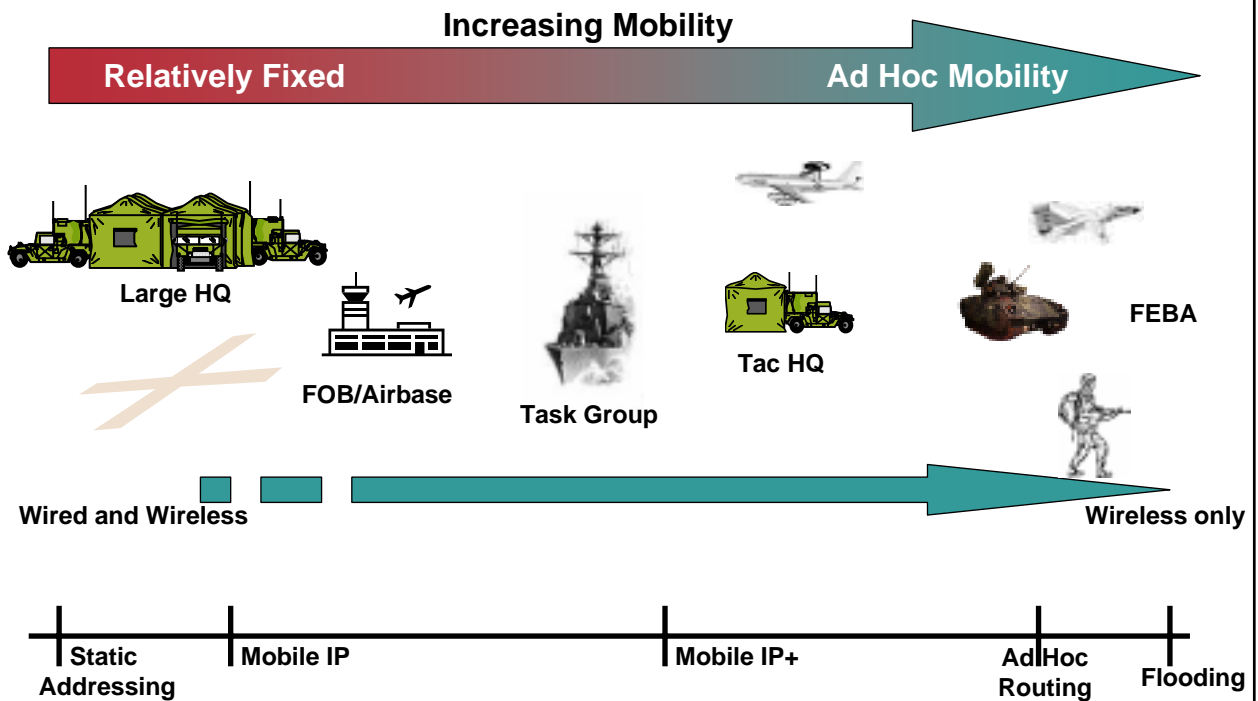
Peter Holliday

Defence Architect

Global Defence and Space Group

Actionable Information:
The Right Info to the Right Decision Maker at the Right Time

Mobile Networking Spectrum

Increasing Mobility

Relatively Fixed → **Ad Hoc Mobility**

Large HQ

FOB/Airbase

Task Group

Tac HQ

FEBA

Wired and Wireless → **Wireless only**

| Static
Addressing | Mobile IP | Mobile IP+ | Ad Hoc
Routing | Flooding |

4

Mobile Networks

Cisco.com

Mobile Networking Spectrum

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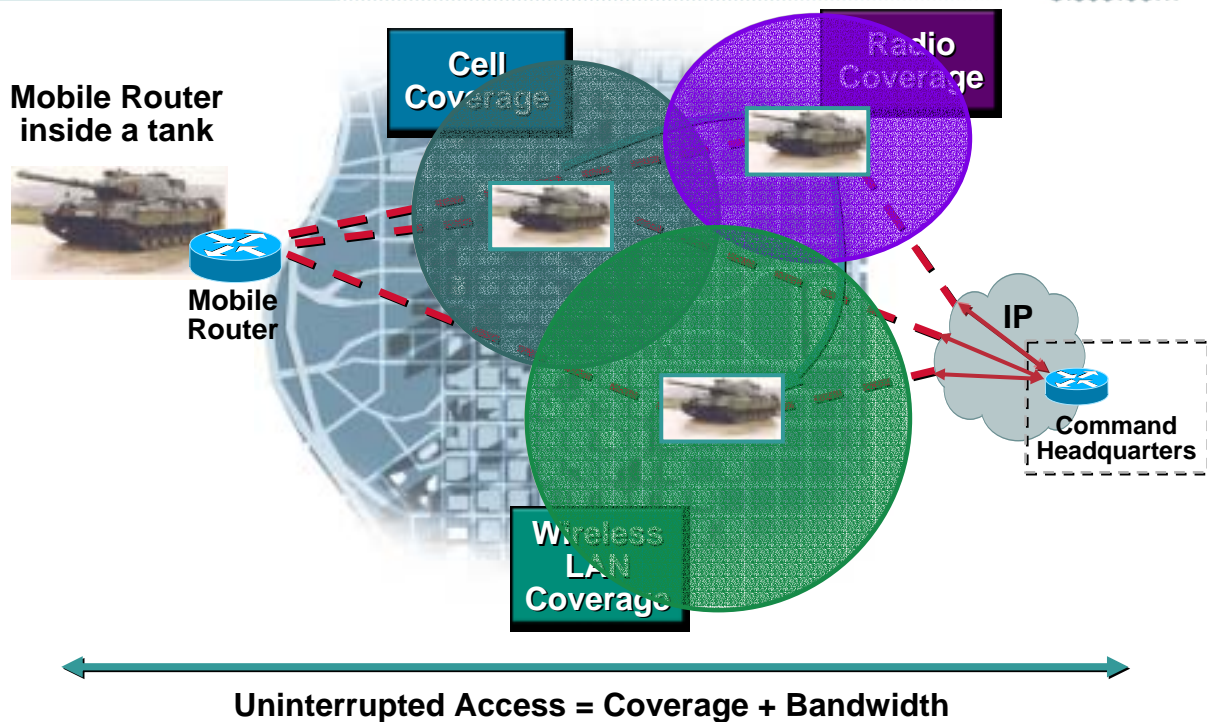| Static Addressing | Mobile IP | Mobile IP+ | Ad Hoc Routing | Flooding |
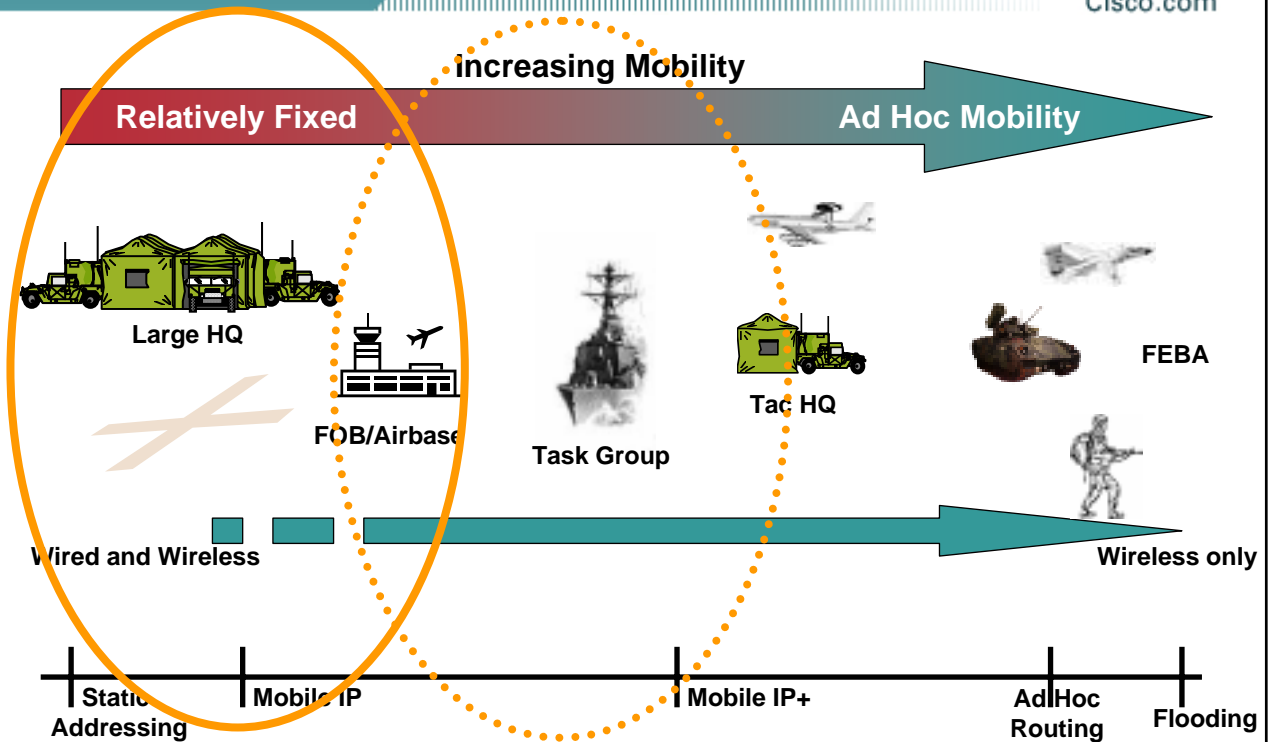
Mobile Network Characteristics

- **Convergence**

    Multi level secure, single network media, Voice, Video and Data

- **More use of wireless in the HQ as an adjunct**

- **IP Routing is stable**

- **IP Addressing flexibility for roaming**

- **Legacy Gateways – CEoIP, LMR**
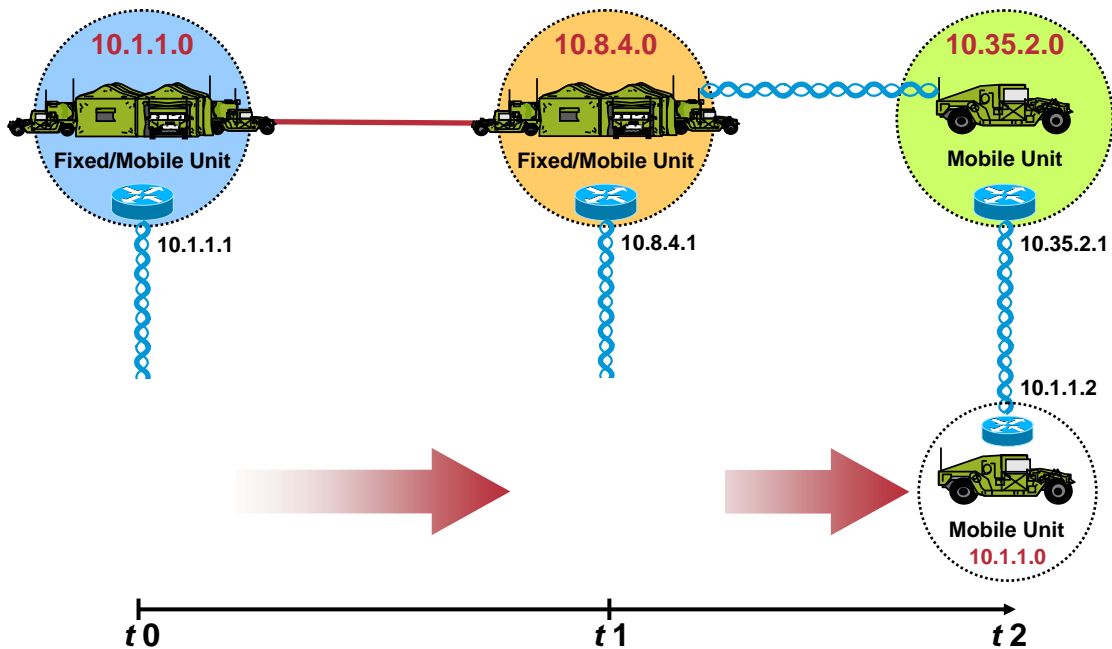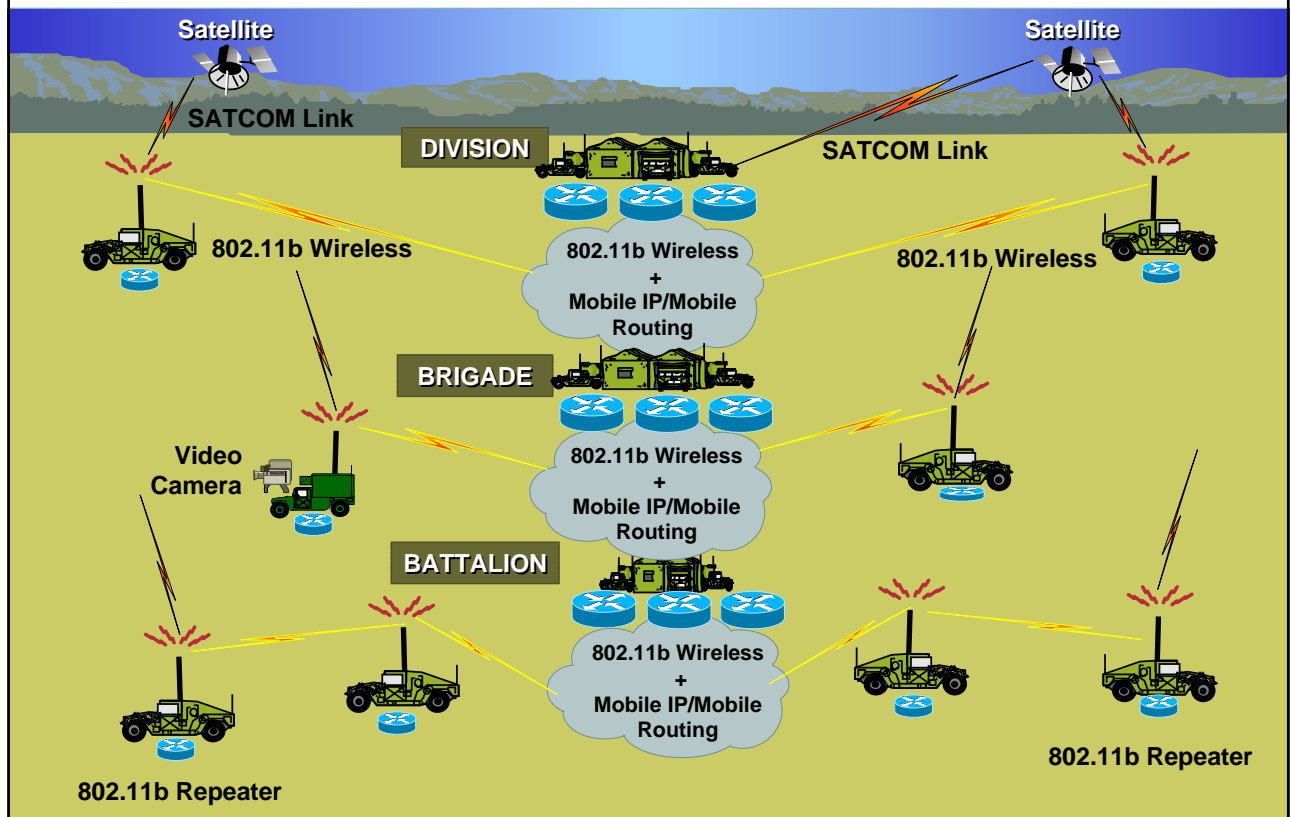
Seamless Mobility with Mobile IP

Mobile Router inside a tank

Mobile Router

Cell Coverage

Radio Coverage

Wireless LAN Coverage

IP

Command Headquarters

Uninterrupted Access = Coverage + Bandwidth

Cisco C4I IP Mobility Solutions

Seamless Network to Network Roaming

10.1.1.0

Fixed/Mobile Unit

10.1.1.1

10.8.4.0

Fixed/Mobile Unit

10.8.4.1

10.35.2.0

Mobile Unit

10.35.2.1

10.1.1.2

Mobile Unit
10.1.1.0

t 0   *t* 1   *t* 2

Mobile IP Communications Infrastructure

Satellite

SATCOM Link

DIVISION

SATCOM Link

802.11b Wireless

802.11b Wireless
+
Mobile IP/Mobile Routing

Satellite

802.11b Wireless

BRIGADE

802.11b Wireless
+
Mobile IP/Mobile Routing

Video Camera

BATTALION

802.11b Wireless
+
Mobile IP/Mobile Routing

802.11b Repeater

802.11b Repeater

Naval Mobile IP Communications Infrastructure

Satellite

Satellite

UAV

UAV

UAV

MC2A

Sustaining Base Reachback

Littoral Mobile Nodes

Ad-hoc Communications

Dispersed Communications

Legend

Satellite Links

802.11 Wireless Links

Mobility in the Air

Time

Wireless/3G Cellular Satellite

Ethernet

Ethernet

FA0

FA2

FA3

NCSHA

Geography

Space Segment

Bent Pipe Relay

Satellite Relays

Event Driven,
Ad Hoc Networks

Balloons

Satellite
Clusters

Airplanes

Ground Sensors

TDRSS
Gateway

Business
Networks

Universities

Educational
Services

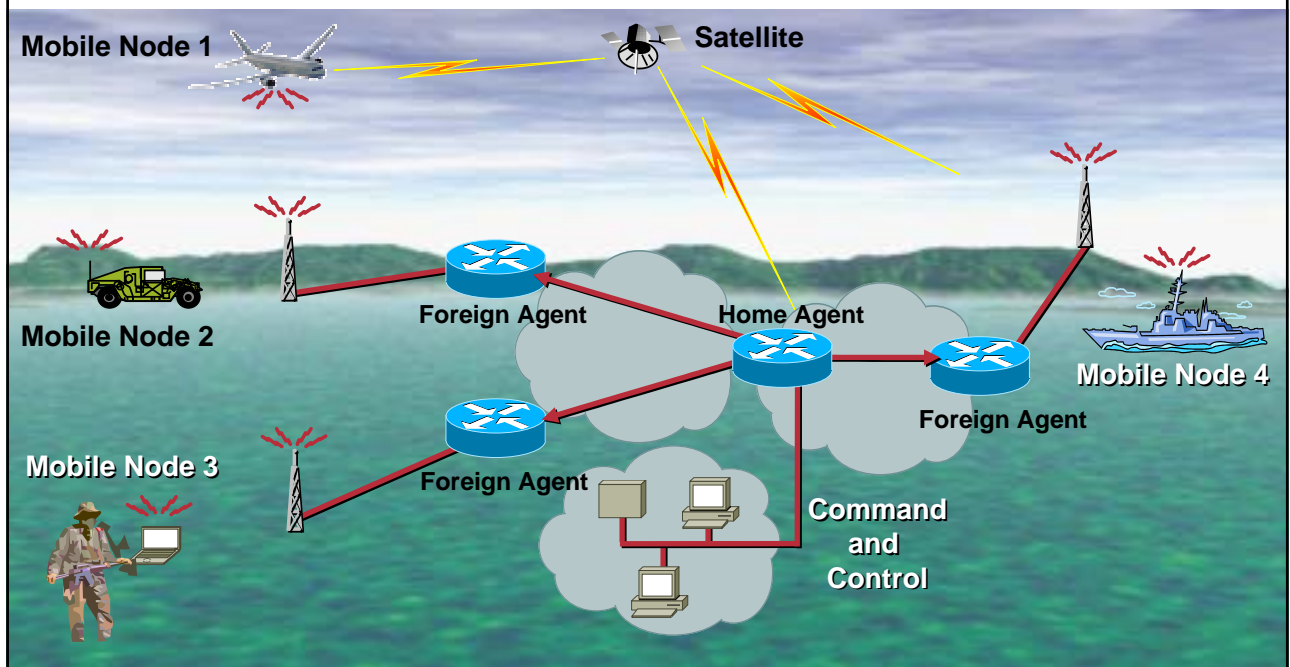The Internet

Ground
Stations

Direct Data
Distribution

Putting it all Together :
MOBILITY = Freedom to Maneuver

Cisco.com

- **Wireless technology has liberated information networks**
- **Mobile IP is necessary for mobility transparency**

Mobile Node 1

Satellite

Mobile Node 2

Foreign Agent

Home Agent

Mobile Node 4

Foreign Agent

Mobile Node 3

Foreign Agent

Command
and
Control

SSTL MAR3251 Integration
DMC Satellite

- **Worlds First COTS Router in Space**

Mobile Subscriber
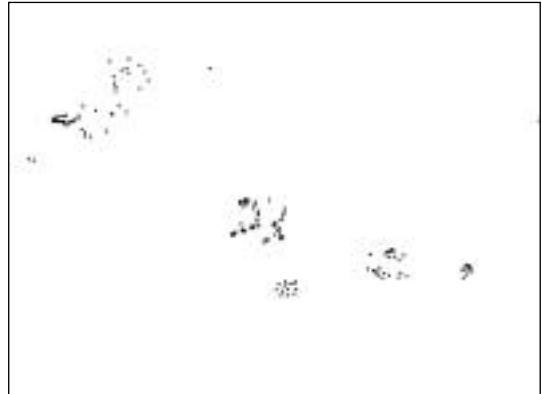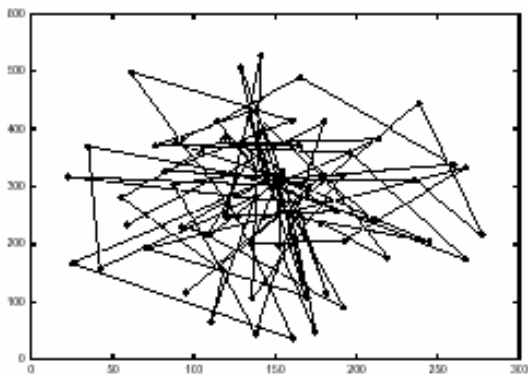
Ad Hoc Networks

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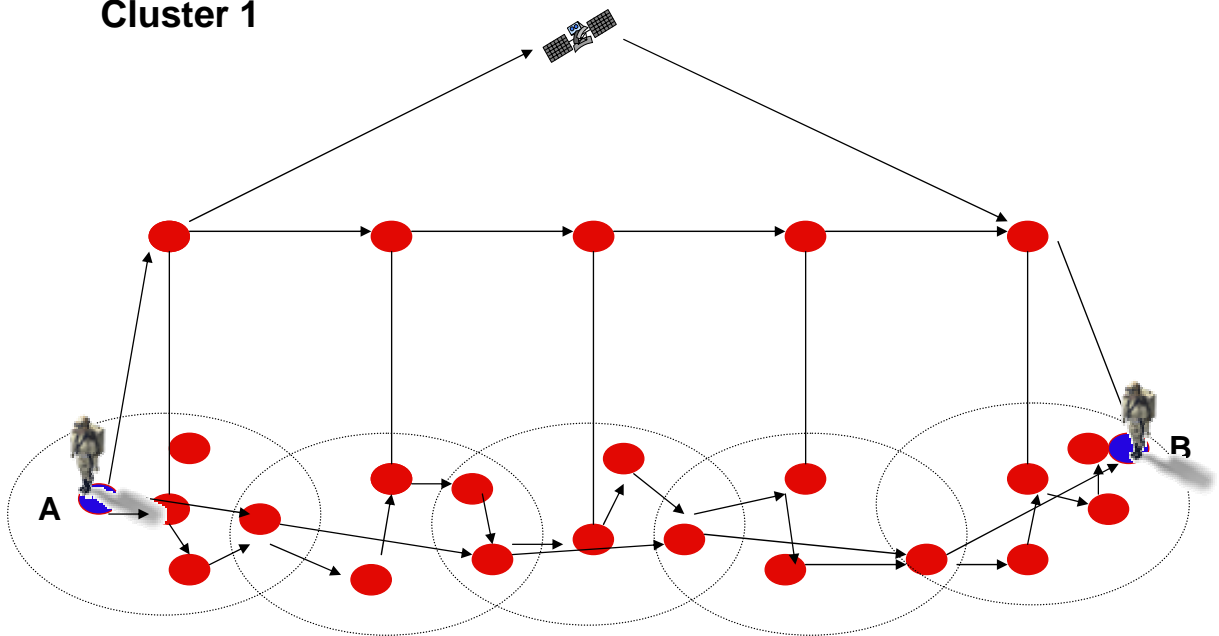| Static Addressing | Mobile IP | Mobile IP+ | Ad Hoc Routing | Flooding |
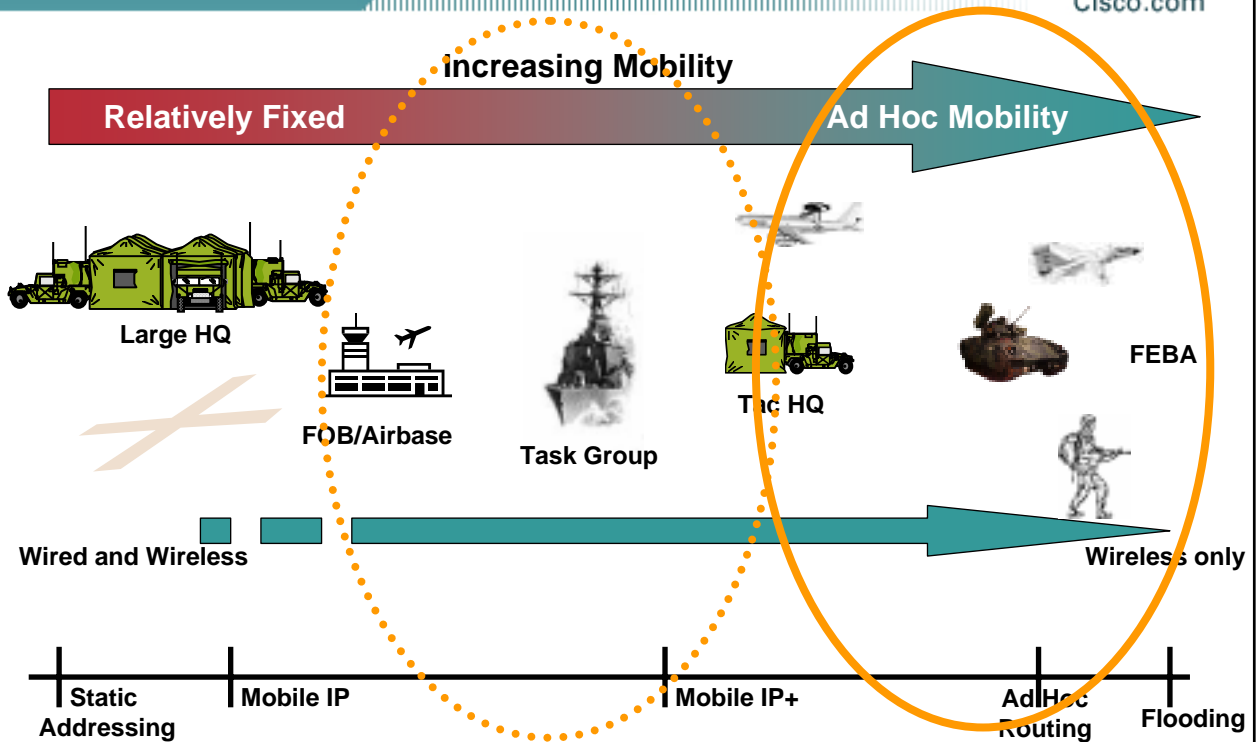
Tactical Network – Highly Mobile Sites

- **Some Observable Characteristics**
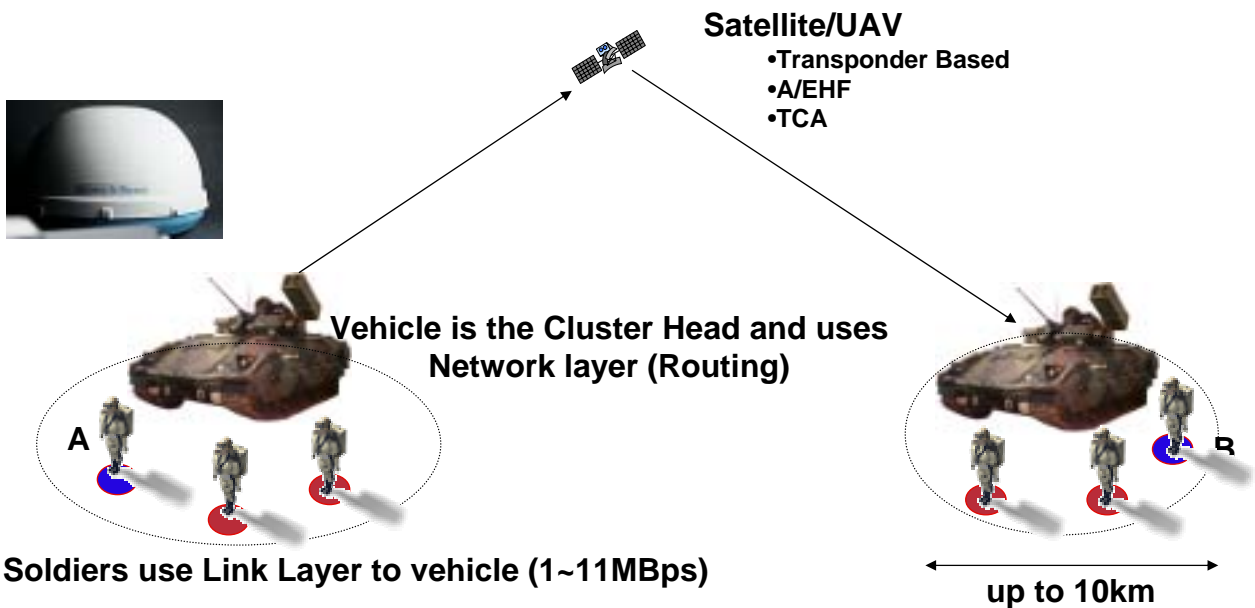- **Military MANET**

Ad Hoc – JTRS Proposed Solutions

- **LANMAR – Research by UCLA, proposed by Boeing JTRS Cluster 1**

Ad Hoc – JTRS Proposed Solutions

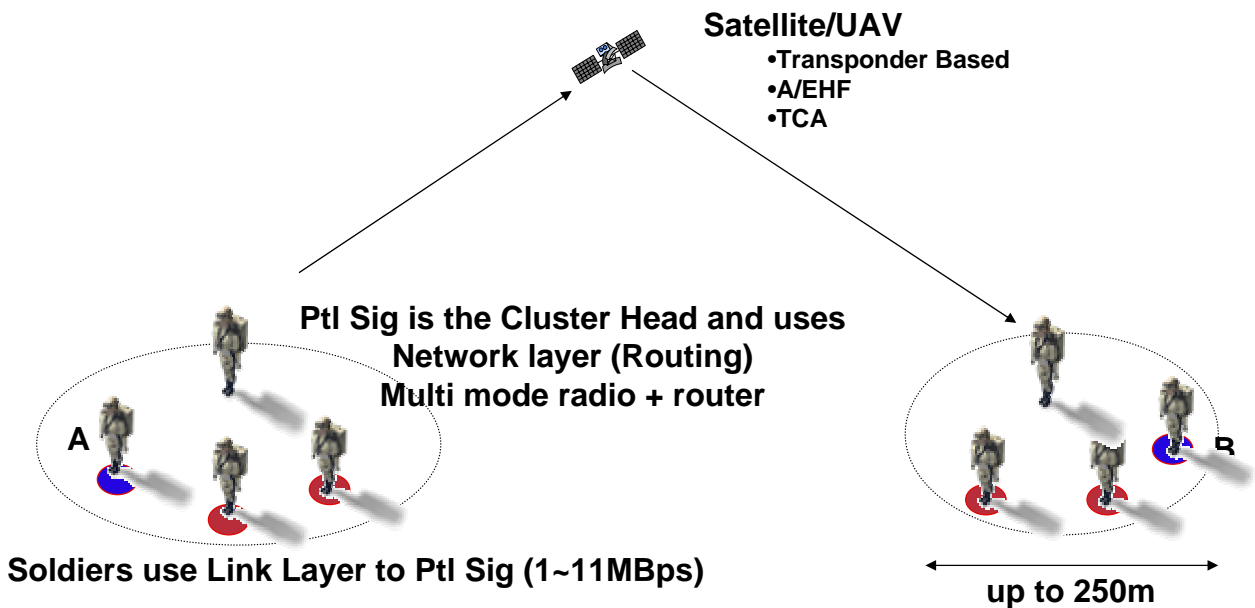- **Vehicle Centric POC Solution**
- **Hybrid Link Layer/Network Layer Solution**

Satellite/UAV
- •Transponder Based
- •A/EHF
- •TCA

Vehicle is the Cluster Head and uses Network layer (Routing)

A

B

Soldiers use Link Layer to vehicle (1~11MBps)

up to 10km

Ad Hoc – JTRS Proposed Solutions

- **Soldier Centric POC Solution**
- **Hybrid Link Layer/Network Layer Solution**

Satellite/UAV
- •Transponder Based
- •A/EHF
- •TCA

**Ptl Sig is the Cluster Head and uses
Network layer (Routing)
Multi mode radio + router**

A

B

Soldiers use Link Layer to Ptl Sig (1~11MBps)

up to 250m