

# **DREN Overview**

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# DREN

- Part of the High Performance Computing Modernization Program (HPCMP)
- Serves Science and Technology (S&T) and Modeling and Simulation (M&S)
- Connects four Major Shared Resource Centers (MSRC) and numerous Distributed Centers (DC)
  - Over 40 TFLOPs of computing resources

# Defense Research & Engineering Network (DREN)

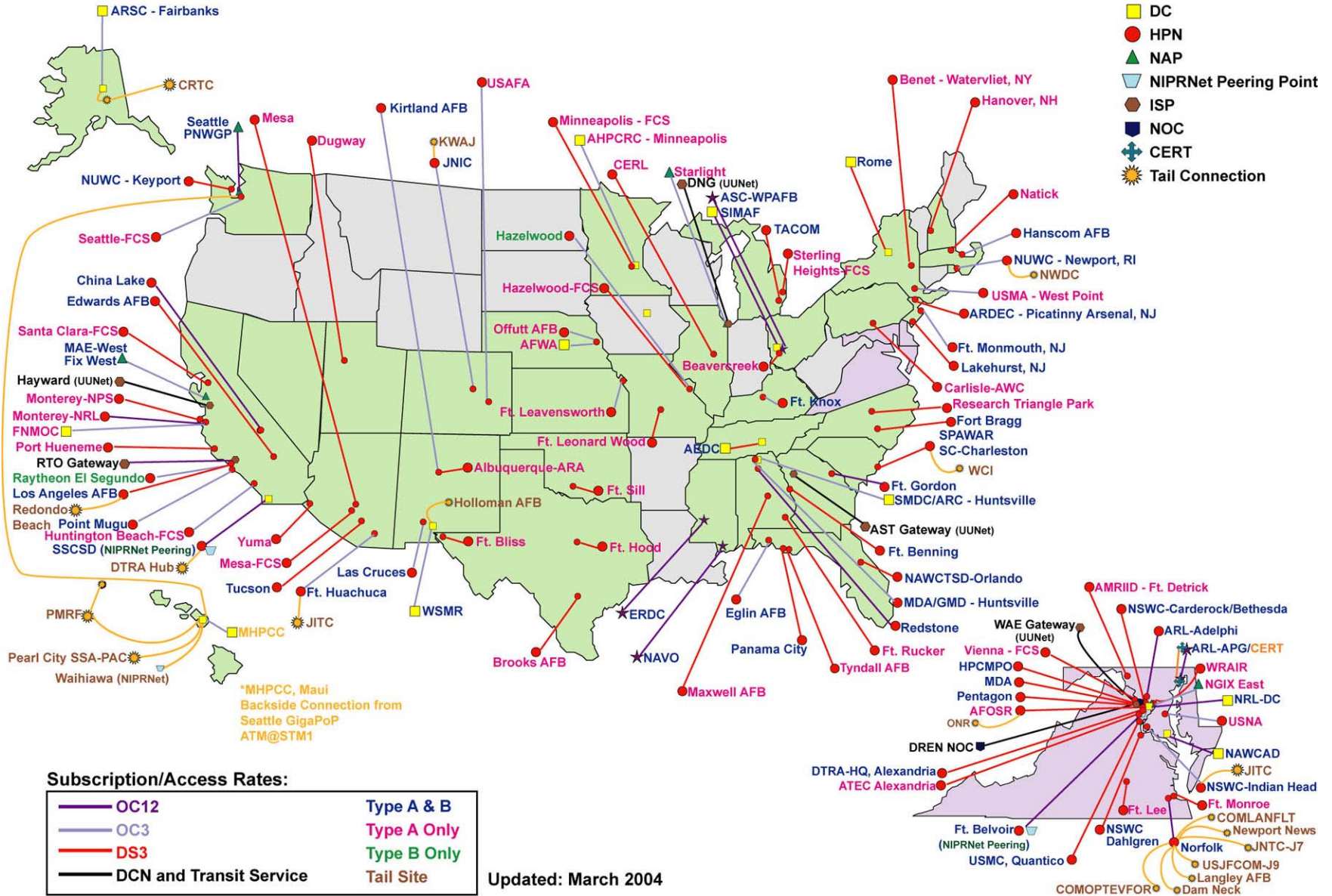


Updated: March 2004

# Defense Research & Engineering Network (DREN) Current Sites

## Legend:

- ★ MSRC
- DC
- HPN
- ▲ NAP
- ◡ NIPRNet Peering Point
- ISP
- NOC
- ⊕ CERT
- ☀ Tail Connection

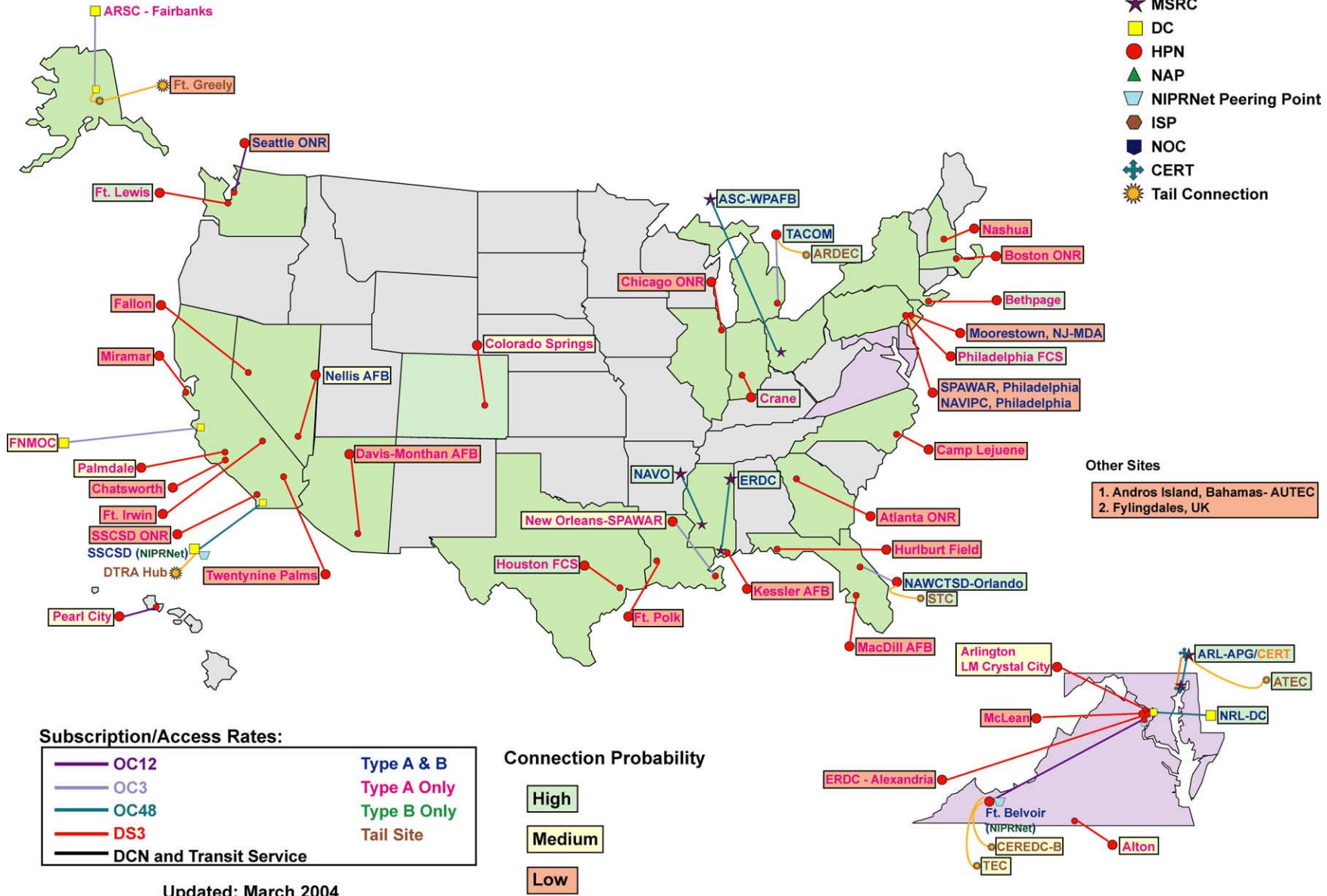


## Subscription/Access Rates:

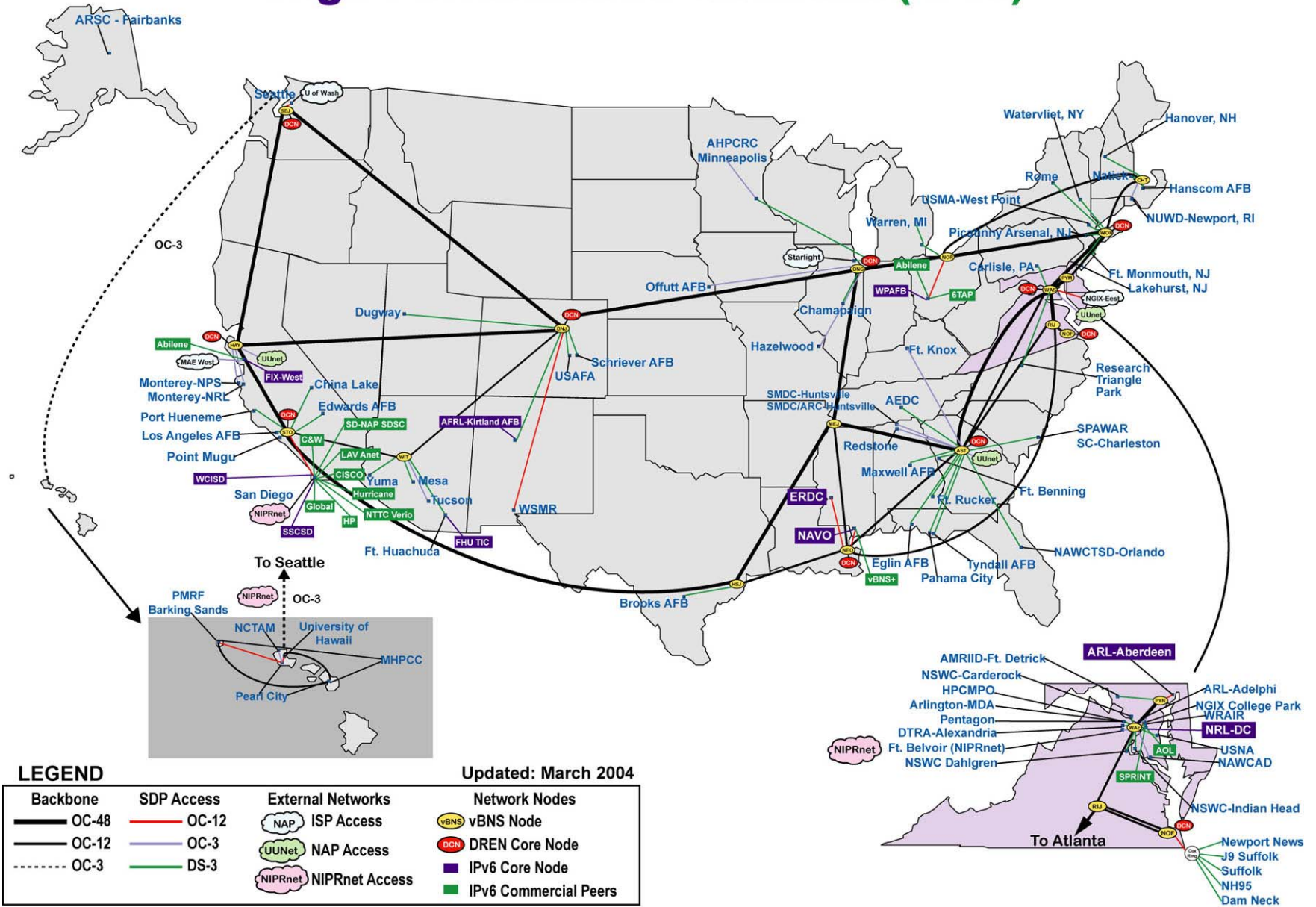
— OC12	Type A & B
— OC3	Type A Only
— DS3	Type B Only
— DCN and Transit Service	Tail Site

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# Defense Research & Engineering Network (DREN) Proposed Future Sites

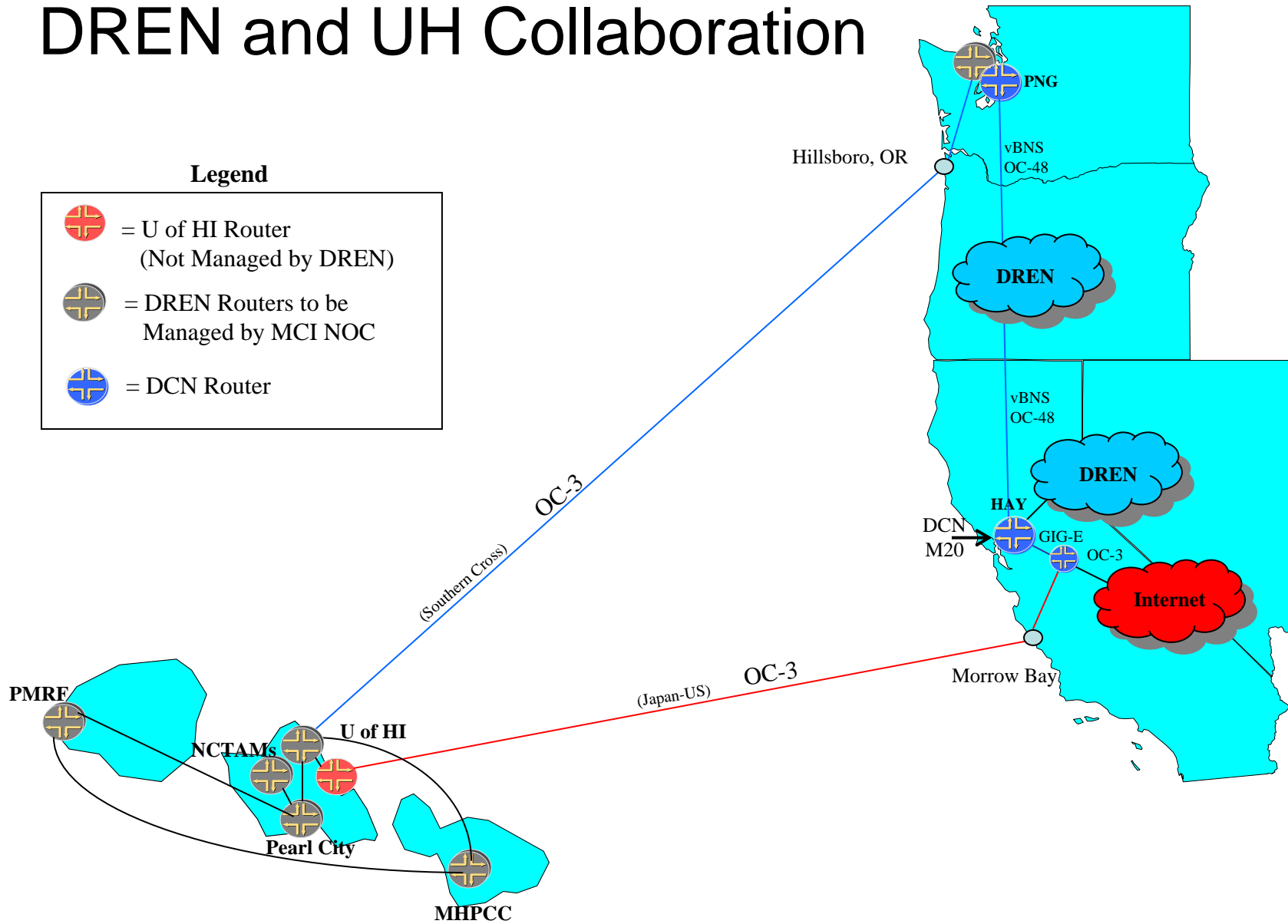
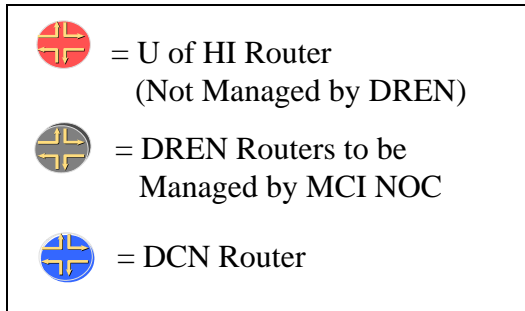


# Defense Research & Engineering Network (DREN) High Performance Network (IPv6)

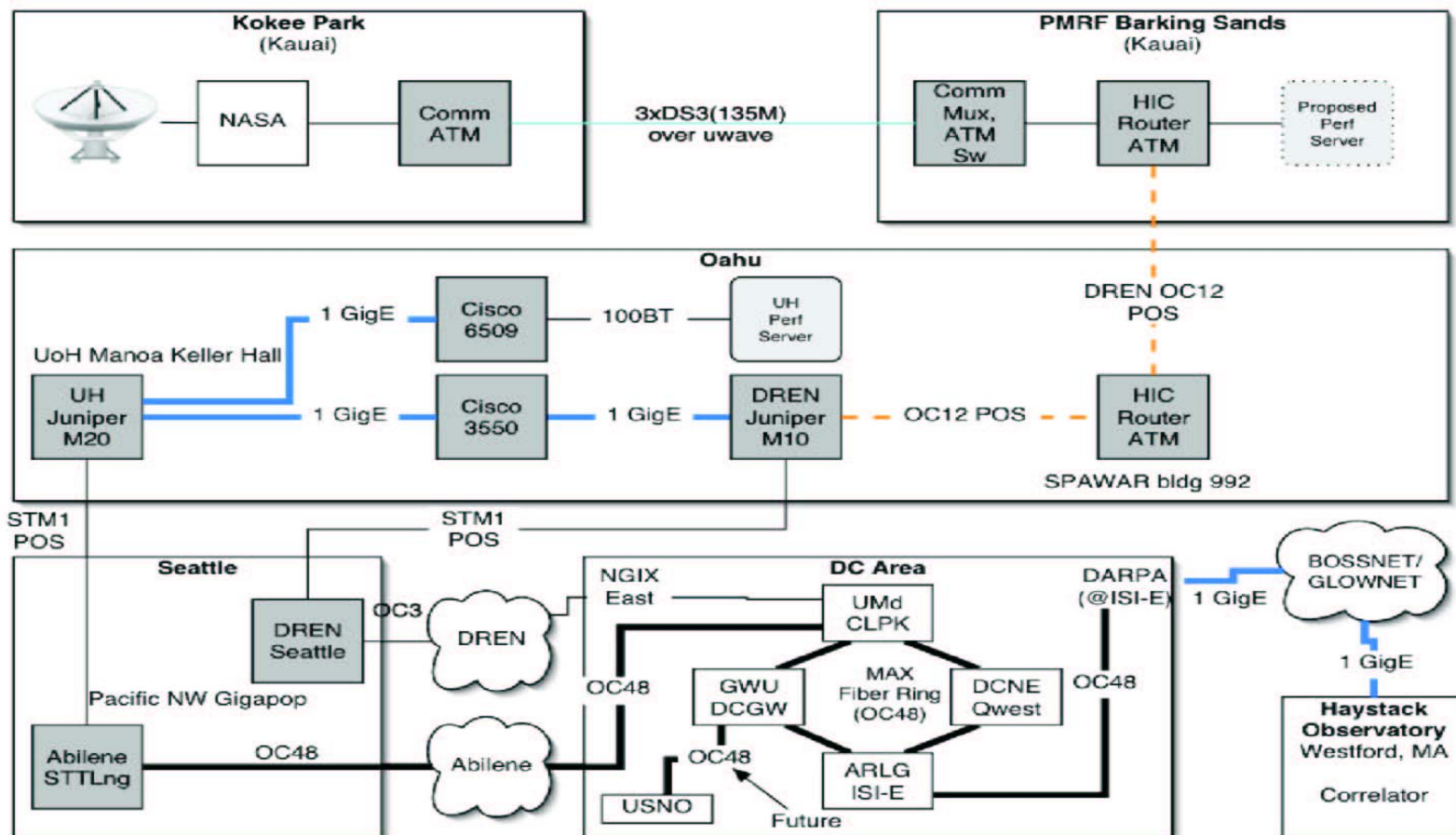


# DREN and UH Collaboration

## Legend



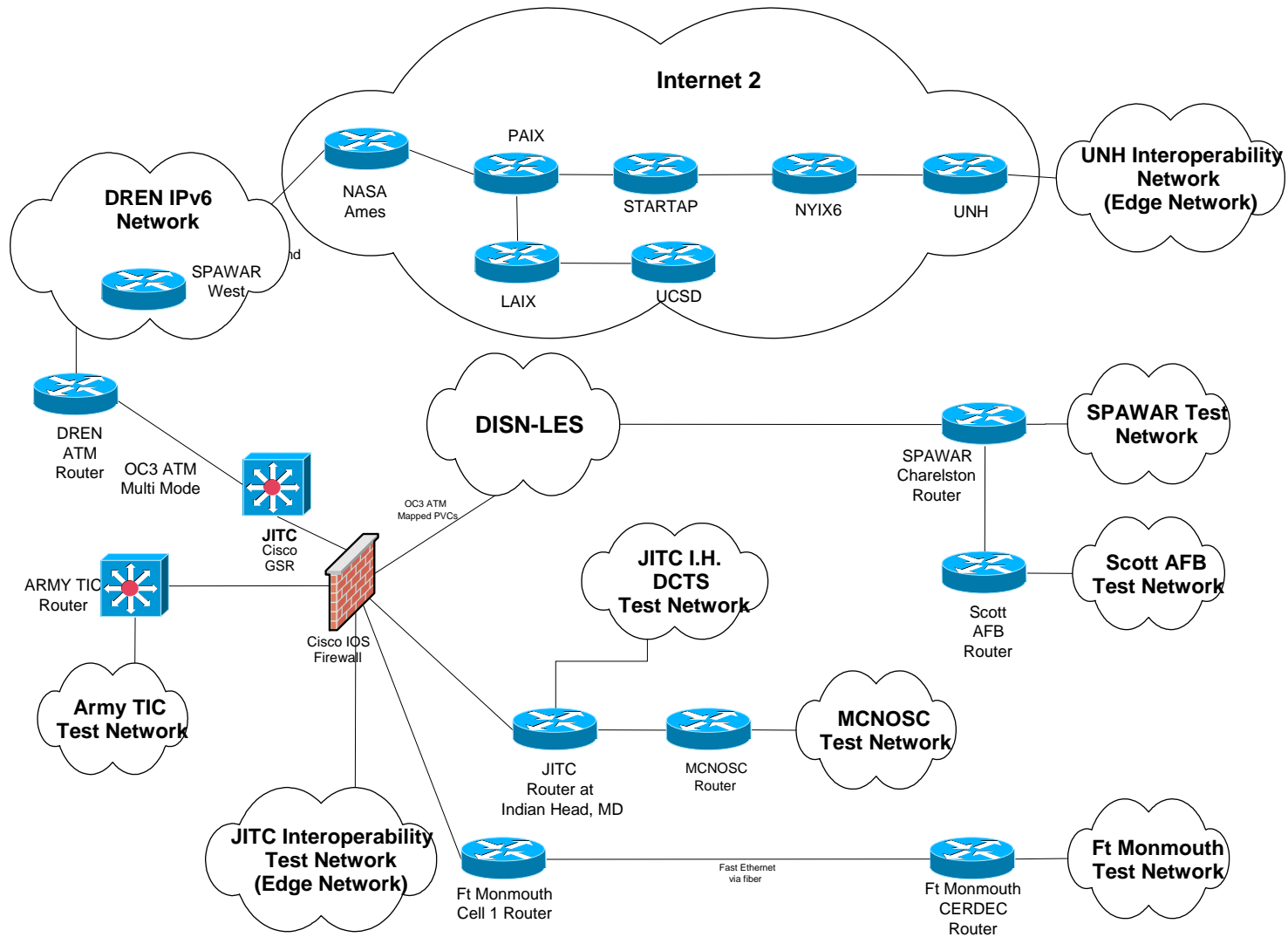
# DREN and NASA Collaboration





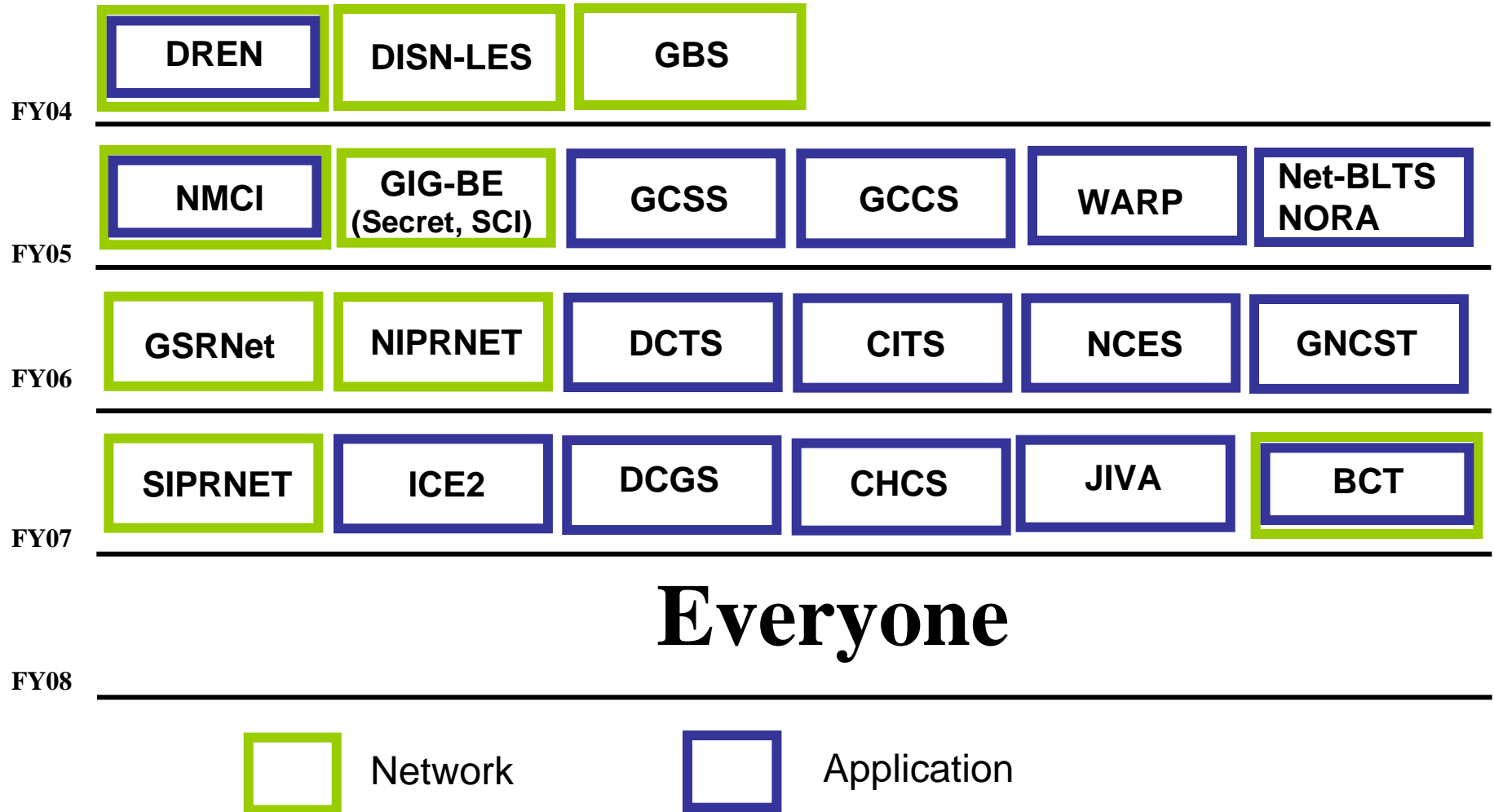
# MOONv6 Architecture

## High Level Architecture



# DoD IPv6 Pilots

## System Transition Schedule



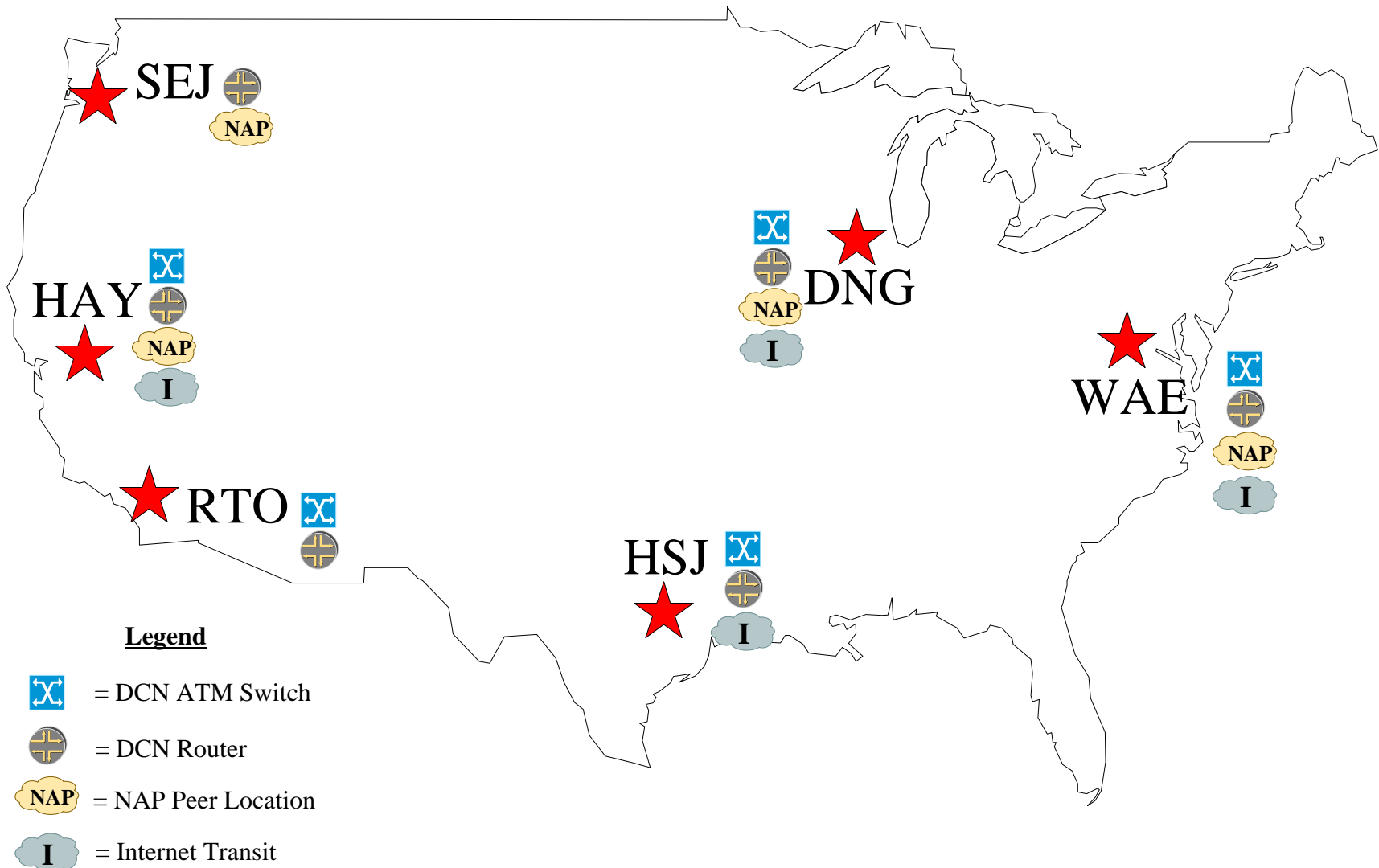
# DREN Contract

- Awarded to MCI, June 2002
- 3 years + 7 option years
- Transition from AT&T Jan – Jun 2003
- DS3 through OC192 +
- MPLS VPN over the vBNS+ core
- IPv4, IPv6, ATM services

# Service Delivery Points (SDP)

- Interface between site and DREN WAN
- Juniper M-series router
  - IP and/or ATM over MPLS
  - “one box solution” I.e. no ATM switch
- Optional items
  - Network Intrusion Detection (NID)
  - AMP Performance Monitor
  - ATM and/or IP encryption

# DREN Core Nodes (DCN)



# Why ATM?

- Secret+ encryption at wire speed
- VPN's (incl. multicast and broadcast!)
- QoS
- Traffic Engineering
- Circuit Emulation
- Special VTC applications

# Why MPLS?

- Allowed ATM over IP
  - But without QoS
- Alternate solution to several VPN and Traffic Engineering uses of ATM

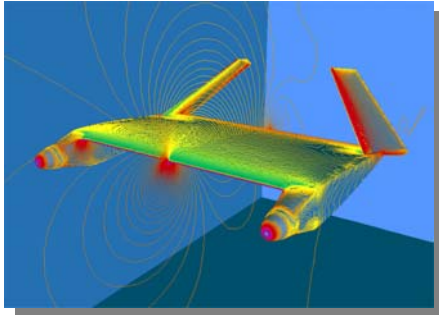
# Are Light Paths the Answer?

- ATM and MPLS let us share bandwidth in the WAN (lower cost), lambda's don't
- Light paths could be ATM all over again
  - Didn't connectionless win?
- Maybe just a step in getting telco stuff out of the way?

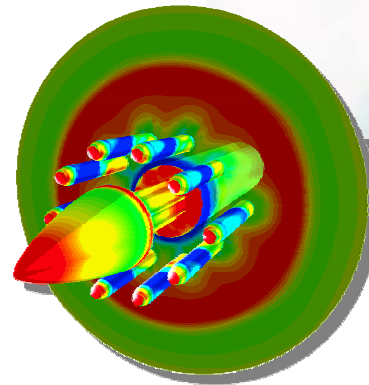


# HPCMP Applications

**Micro Air Vehicles**



**Joint Strike Fighter**

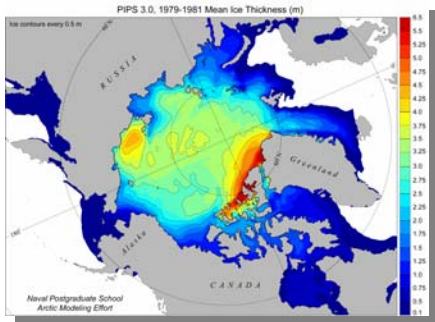


**Smart Weapons Design**

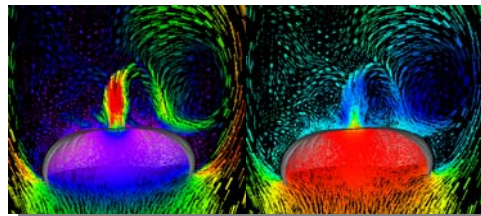
**Surveillance Systems**



**Ocean Modeling**



**Parachute Simulations**



**Unmanned Air Vehicle**



**Blast Protection**



# Network Stressing Apps

- Large File Transfer
  - Still the number one requirement
- Disaster Recovery (DR)
  - Remote site backup of supercomputer data
- Extreme Multicast
  - Thousands of groups that come and go very quickly

# ATM Teleconferencing

- Marconi Virtual Presence (ViPr)
- High quality audio and video (MPEG2)
- Stress tests the ATM over MPLS network
  - Had to increase 1 msec CDTV in ATM switches

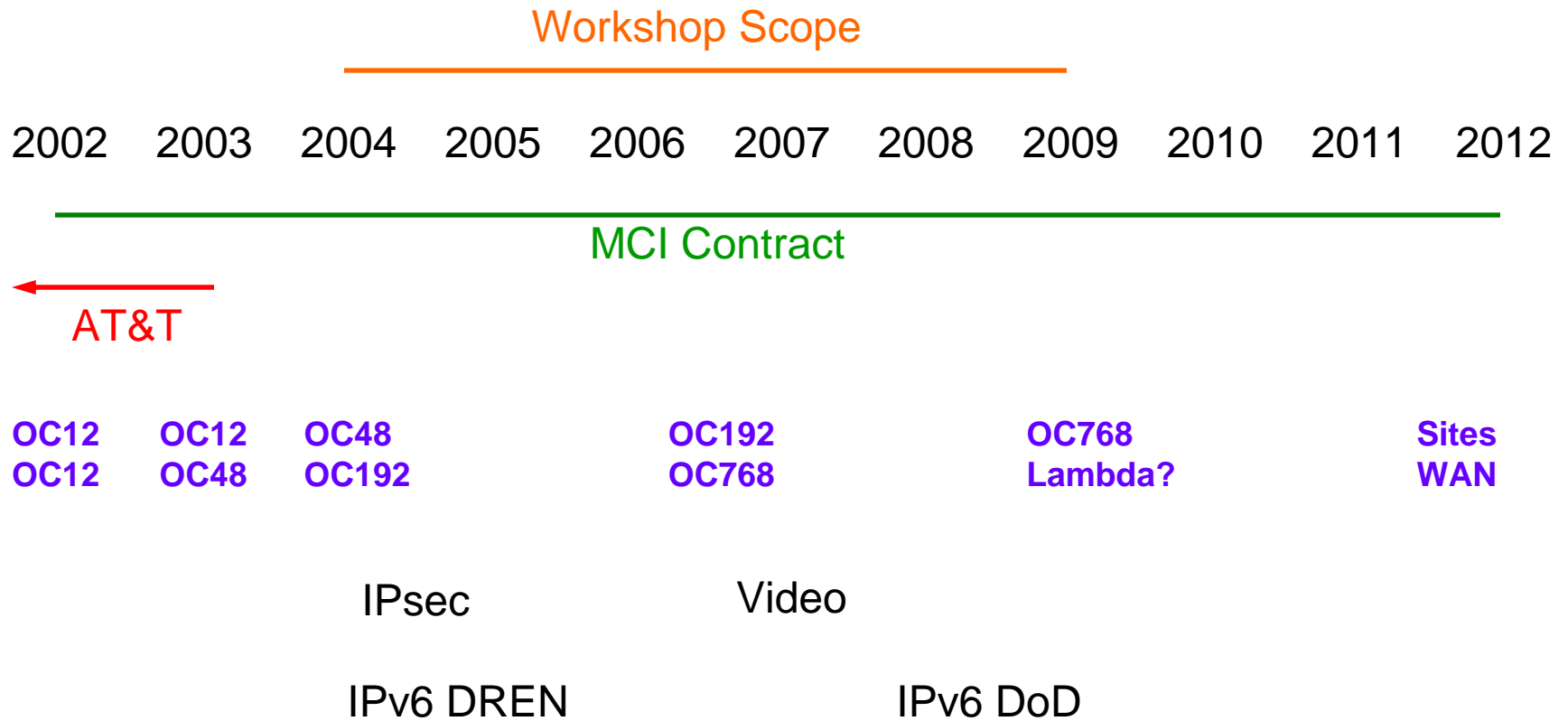


# Security

(incl IPv6 and wire speed)

- Encryption
  - ATM Fastlane (KG75) – wire speed to OC12
  - IP TACLane (KG175) – not wire speed
  - IPsec for unclassified
- Kerberos/SecurID infrastructure
  - kftp tools and Kerberized apps
- CAC Cards for PKI certificates
- Network Intrusion Detection

# DREN Timeline



# Network Speeds Over Time

