NEMO Experiments

IPv4 & IPv6

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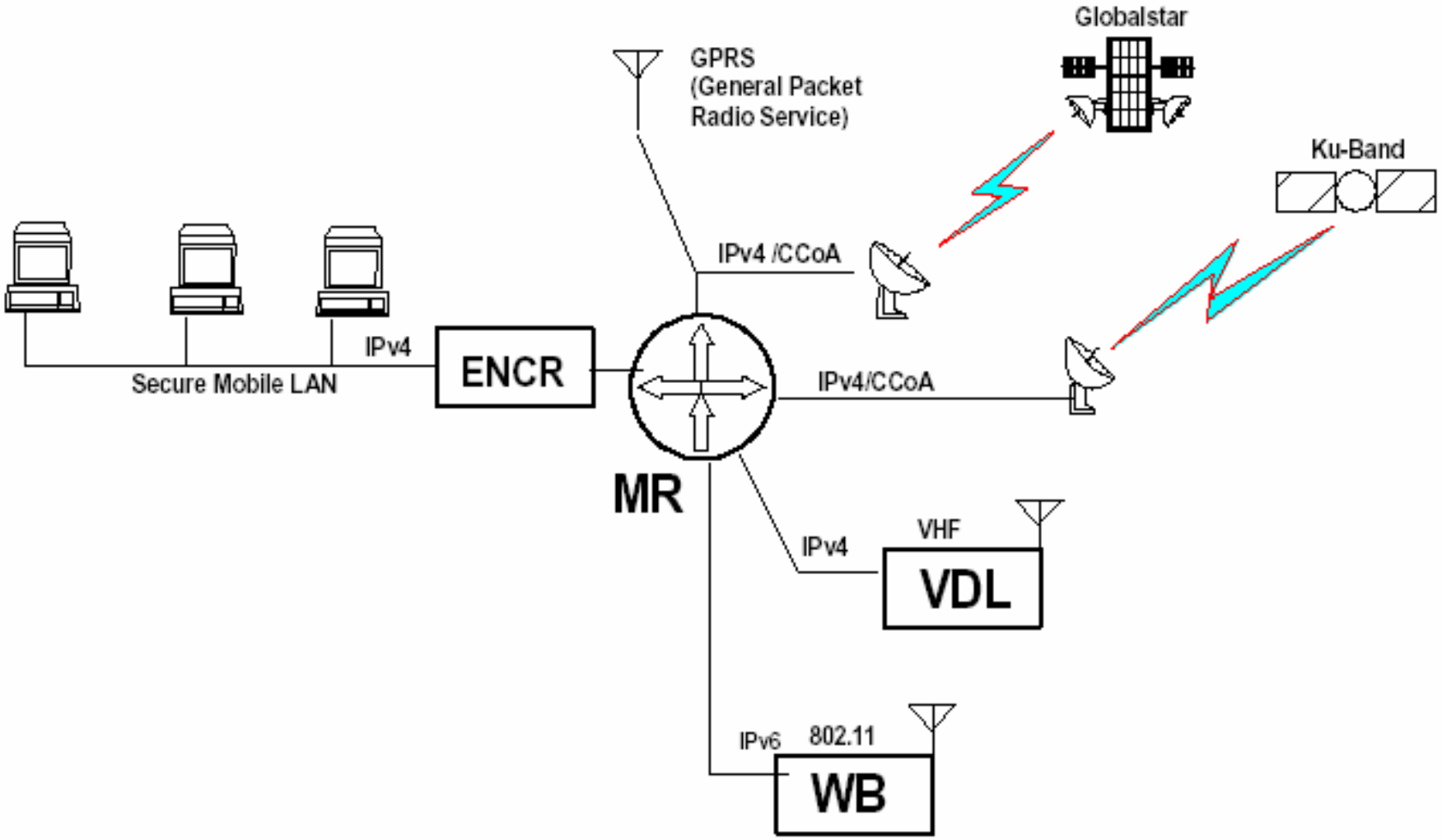
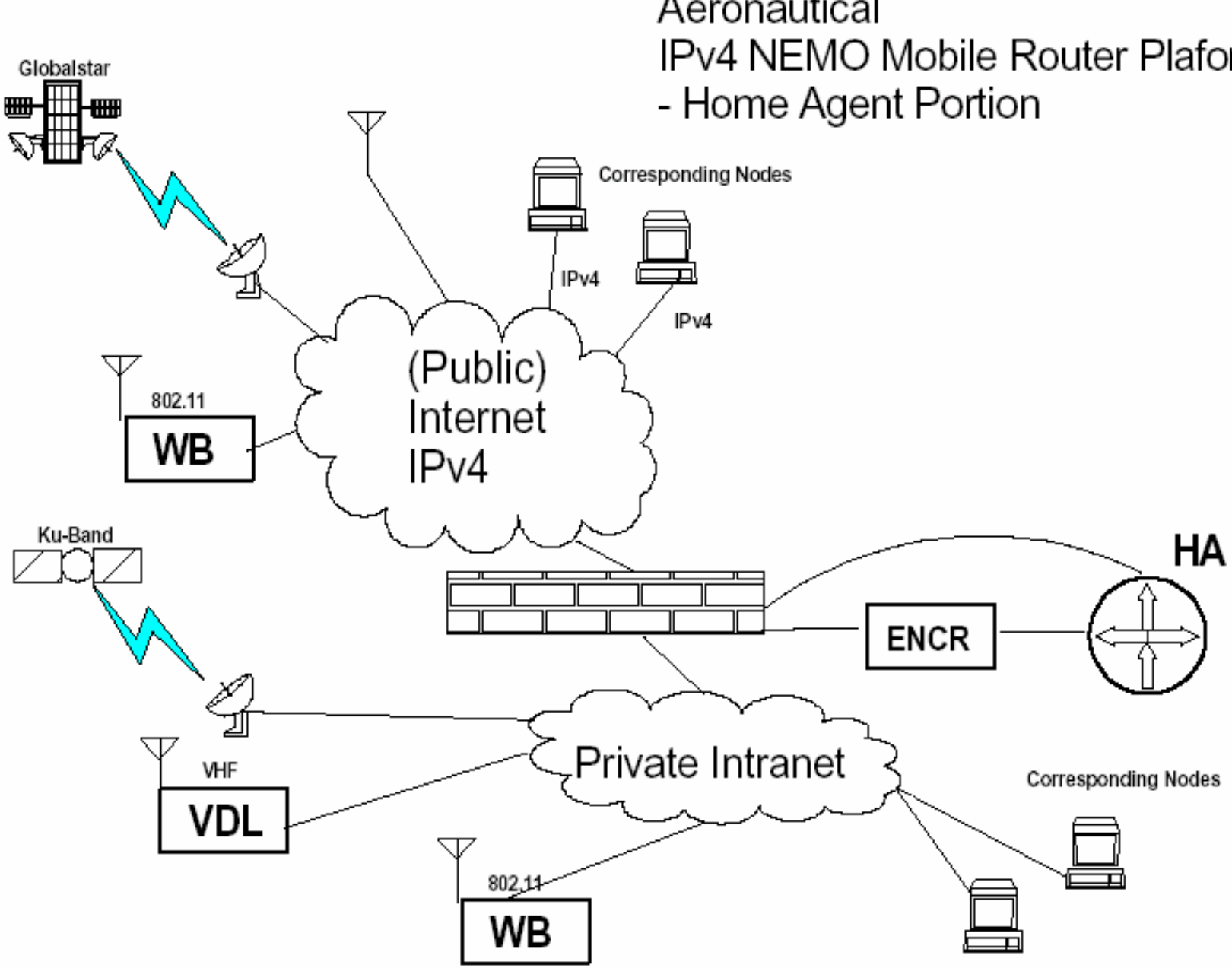
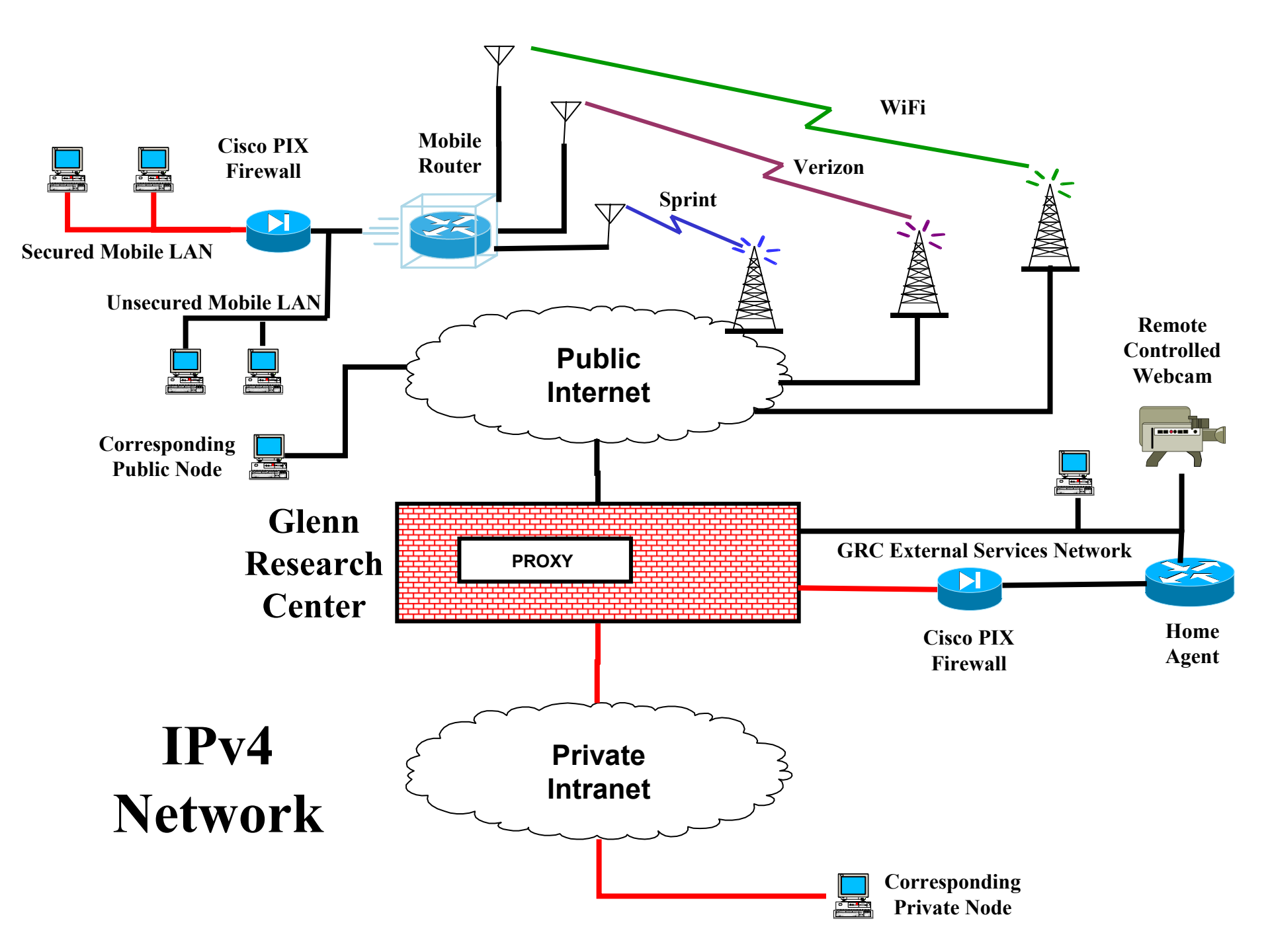
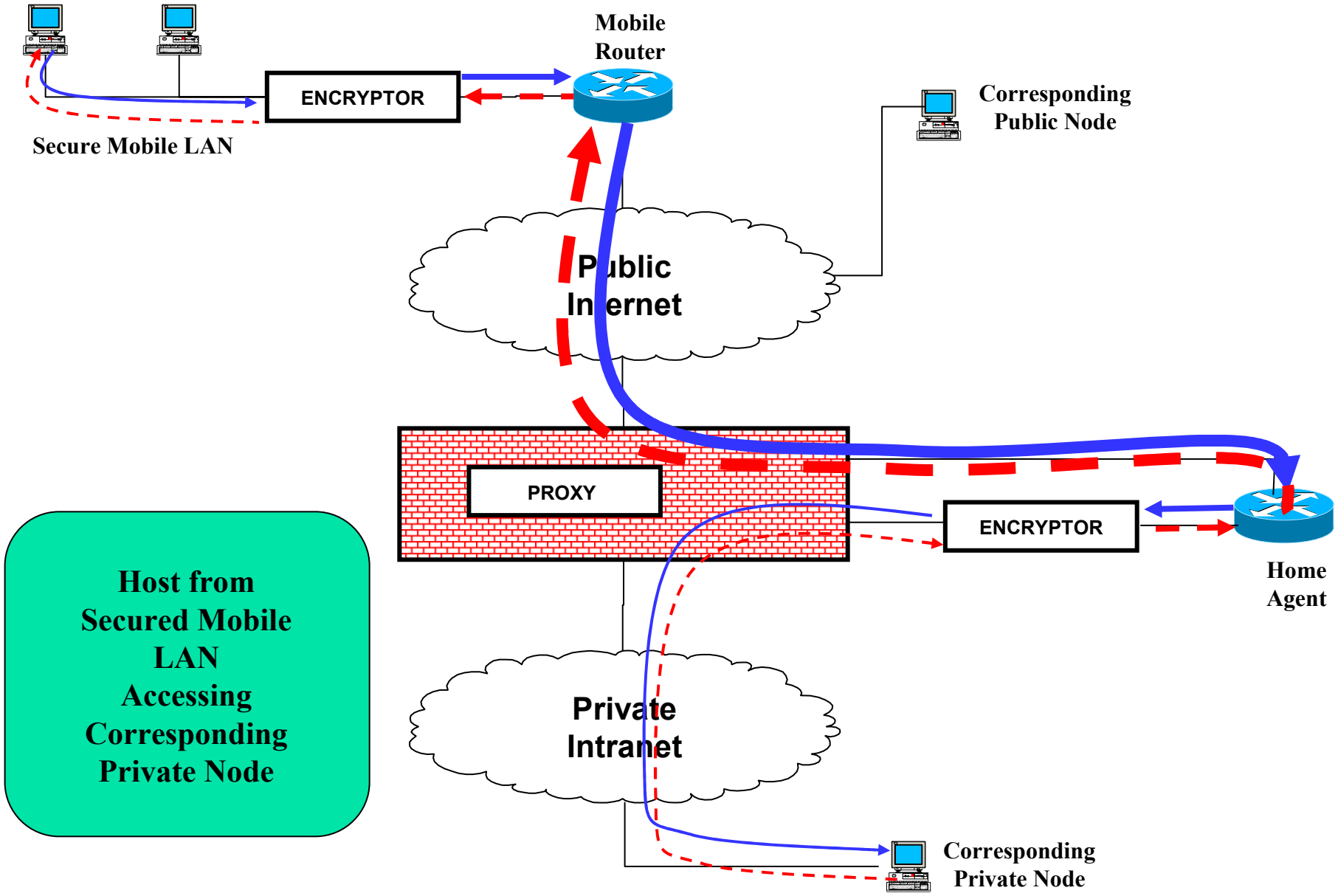
Pick ICNS Demonstration

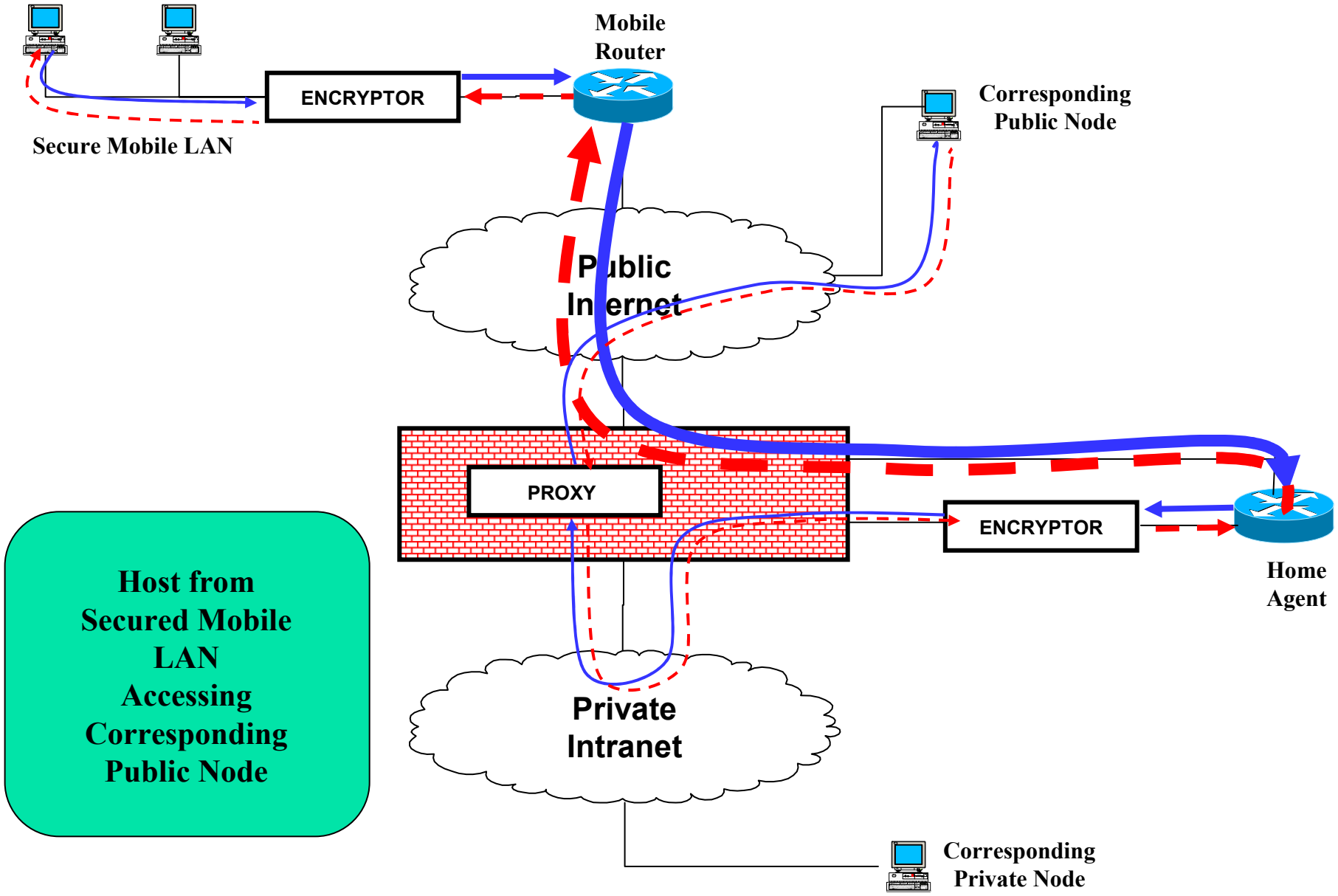
Aeronautical
IPv4 NEMO Mobile Router Plaform
- Mobile Router Portion




Aeronautical
IPv4 NEMO Mobile Router Plaform
- Home Agent Portion
Globalstar
Corresponding Nodes
IPv4
IPv4
802.11
WB
(Public)
Internet
IPv4
Ku-Band
HA
ENCR
Private Intranet
VHF
VDL
Corresponding Nodes
802.11
WB


WiFi
Verizon
Sprint
Mobile Router
Cisco PIX Firewall
Secured Mobile LAN
Unsecured Mobile LAN
Public Internet
Corresponding Public Node
Remote Controlled Webcam
Glenn Research Center
PROXY
GRC External Services Network
Cisco PIX Firewall
Home Agent
IPv4 Network
Private Intranet
Corresponding Private Node


Mobile
Router
ENCRYPTOR
Secure Mobile LAN
Corresponding
Public Node
Public
Internet
PROXY
ENCRYPTOR
Home
Agent
Private
Intranet
Corresponding
Private Node
Host from
Secured Mobile
LAN
Accessing
Corresponding
Private Node


Mobile
Router
ENCRYPTOR
Secure Mobile LAN
Corresponding
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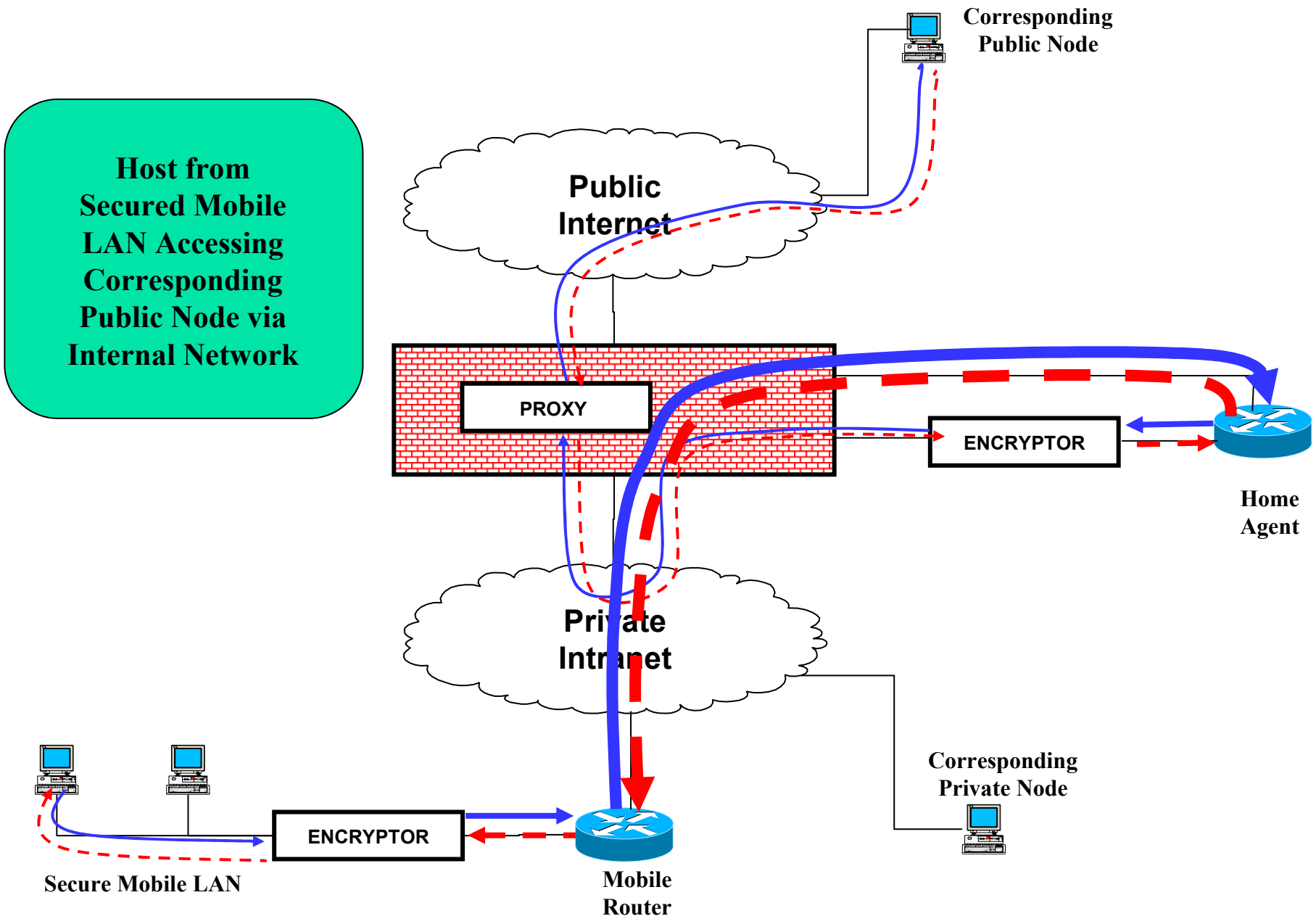
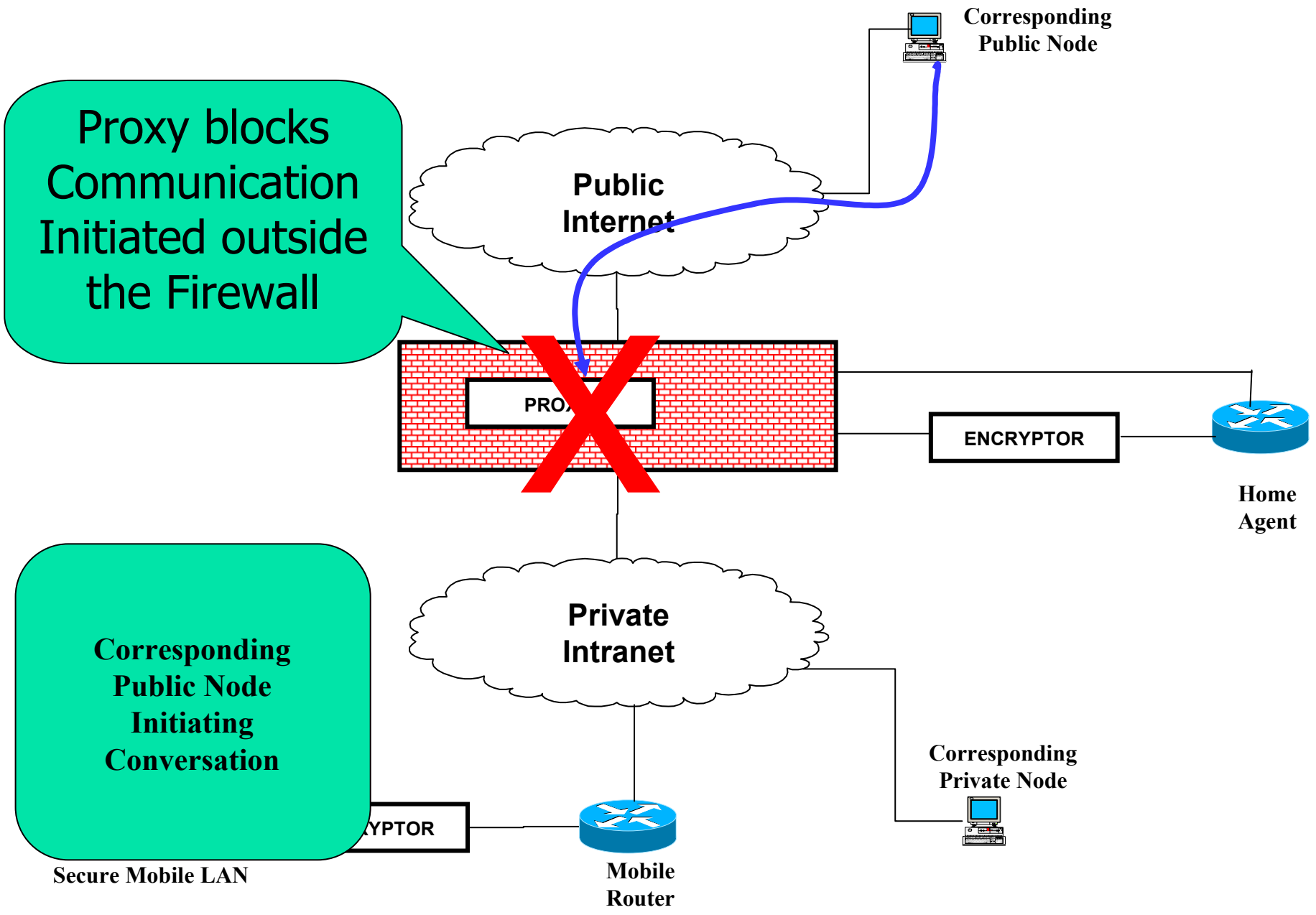
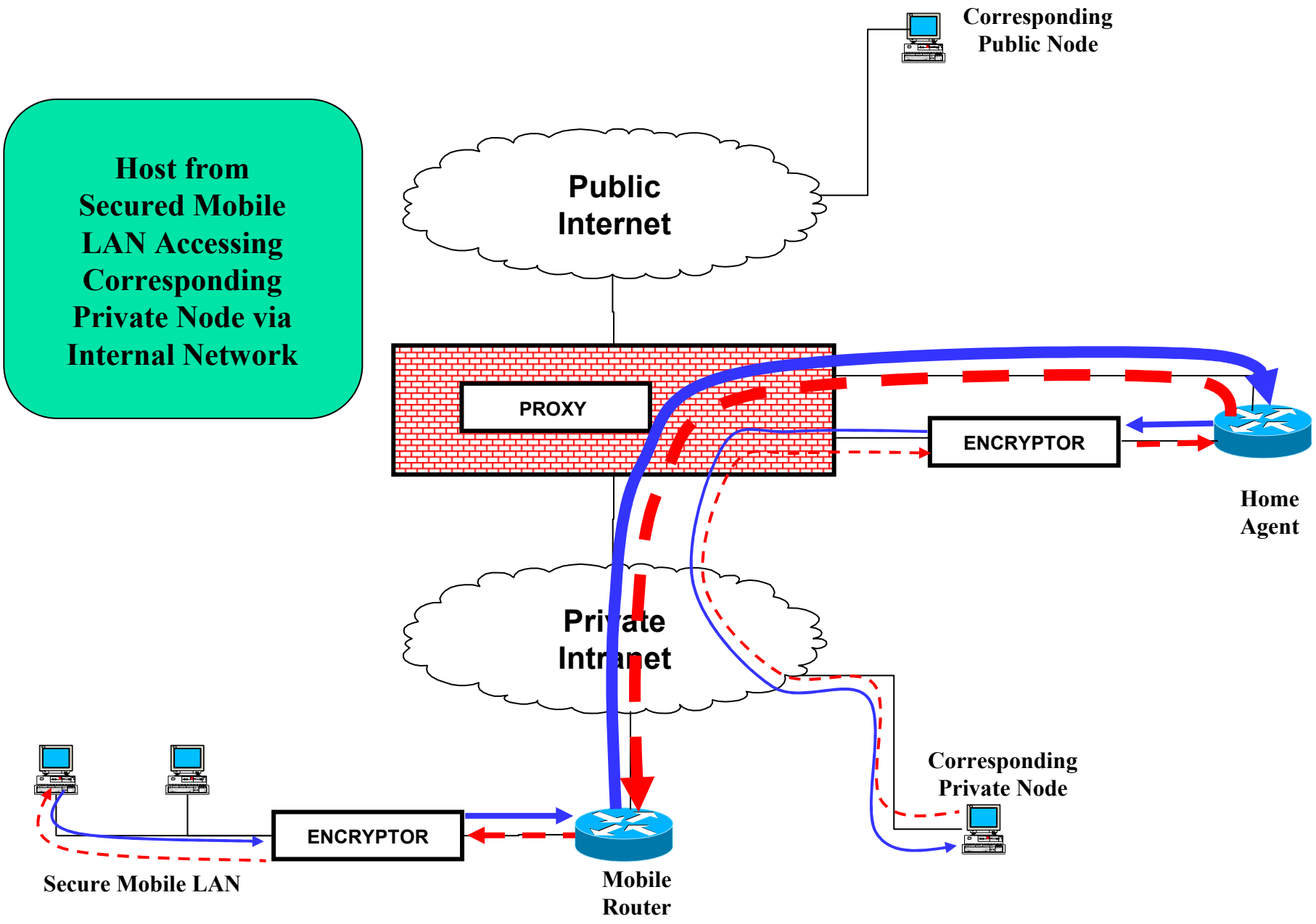
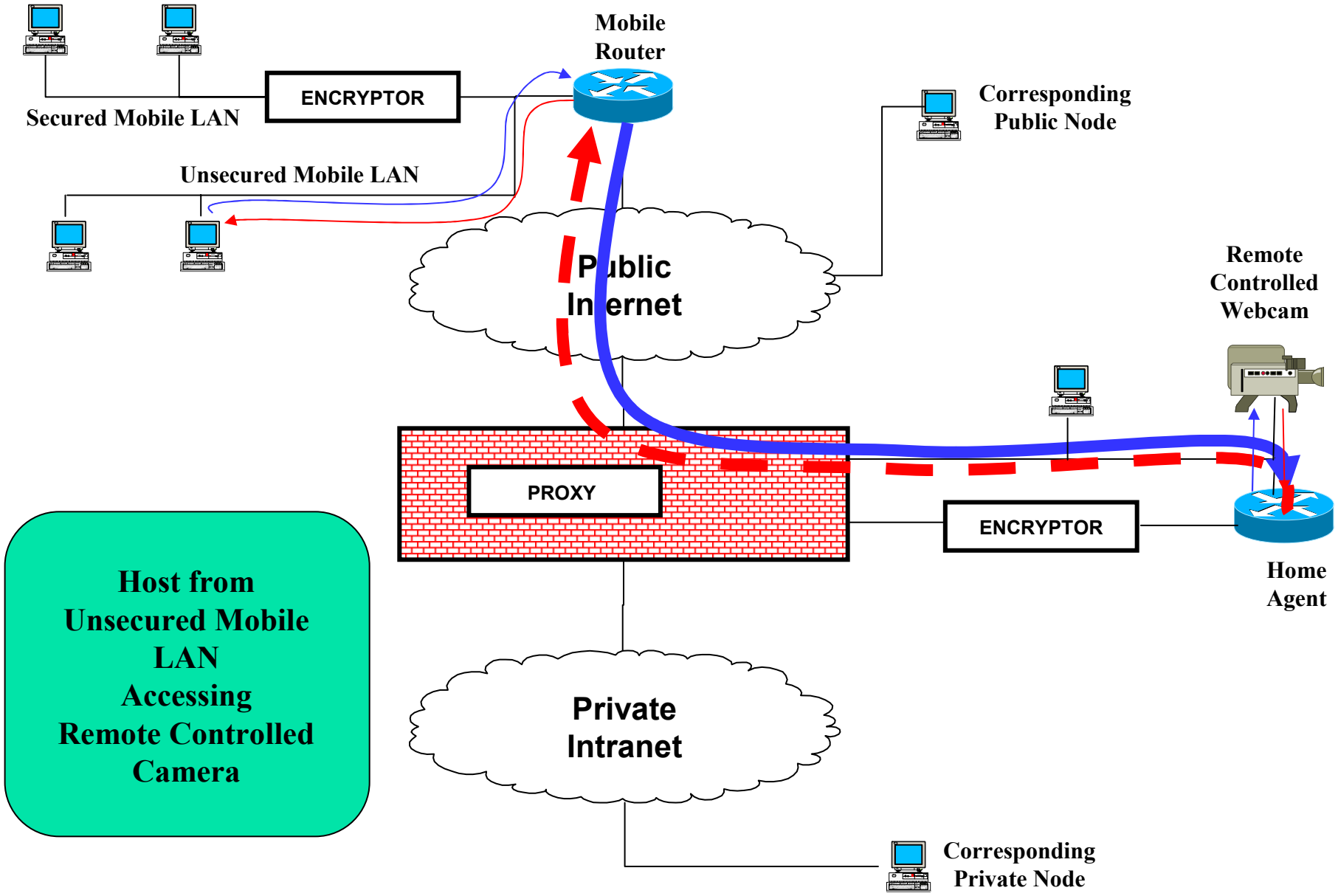
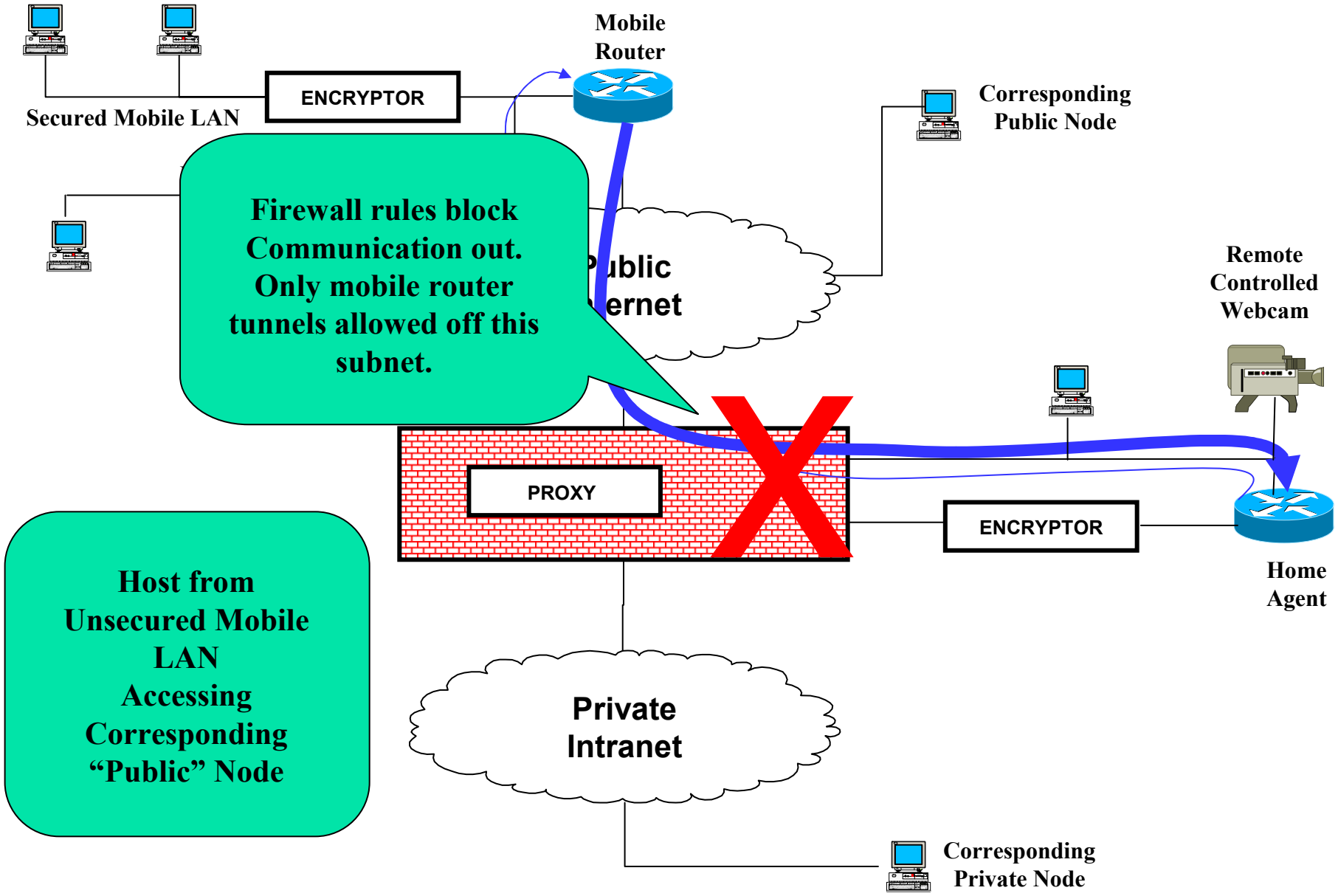
Private Node
Host from
Secured Mobile
LAN
Accessing
Corresponding
Public Node

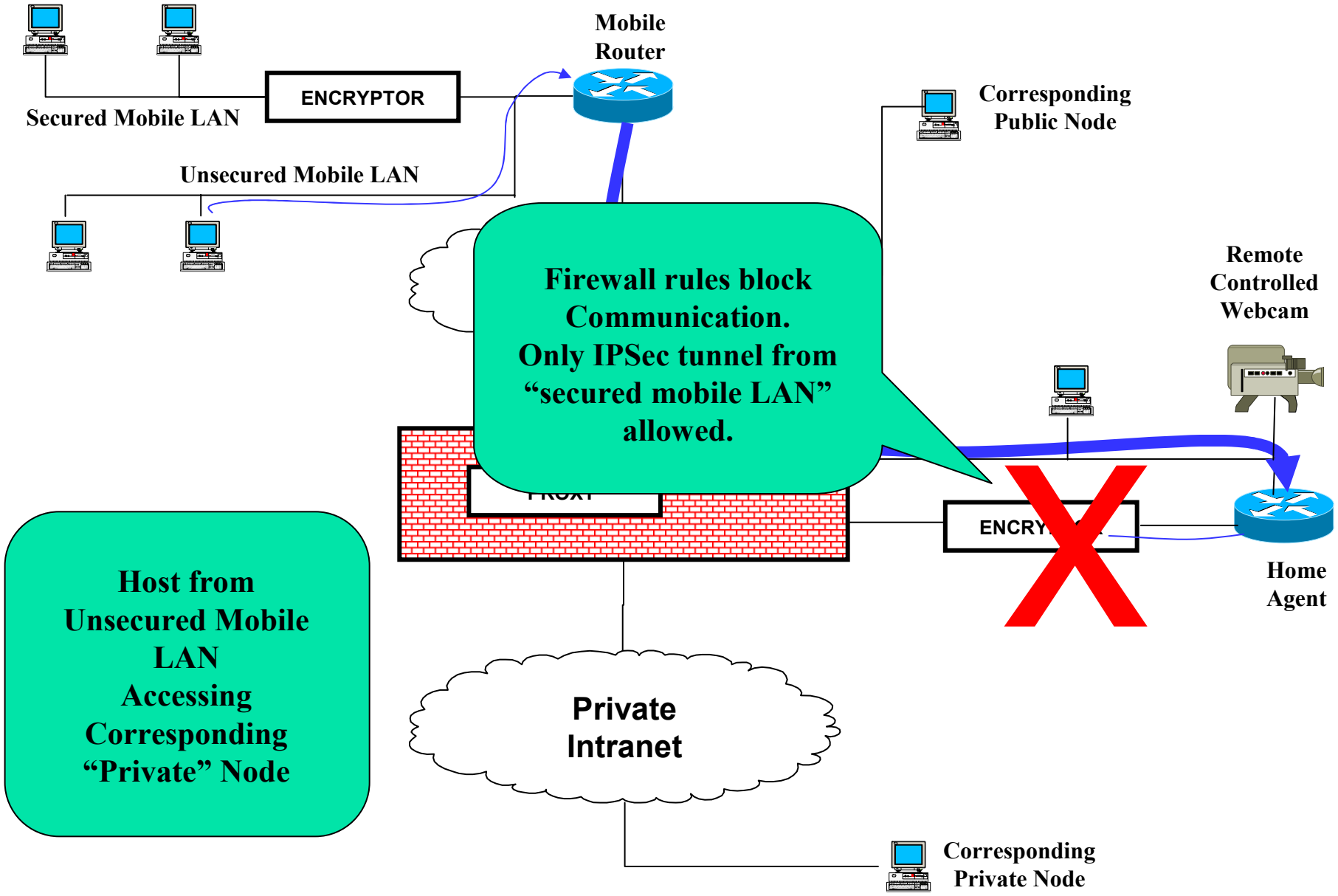

Host from Secured Mobile LAN Accessing Corresponding Public Node via Internal Network
Corresponding Public Node
Public Internet
PROXY
ENCRYPTOR
Home Agent
Private Intranet
Corresponding Private Node
ENCRYPTOR
Secure Mobile LAN
Mobile Router


Corresponding
Public Node
Proxy blocks
Communication
Initiated outside
the Firewall
Public
Internet
PRO
ENCRYPTOR
Home
Agent
Private
Intranet
Corresponding
Public Node
Initiating
Conversation
YPTOR
Corresponding
Private Node
Secure Mobile LAN
Mobile
Router

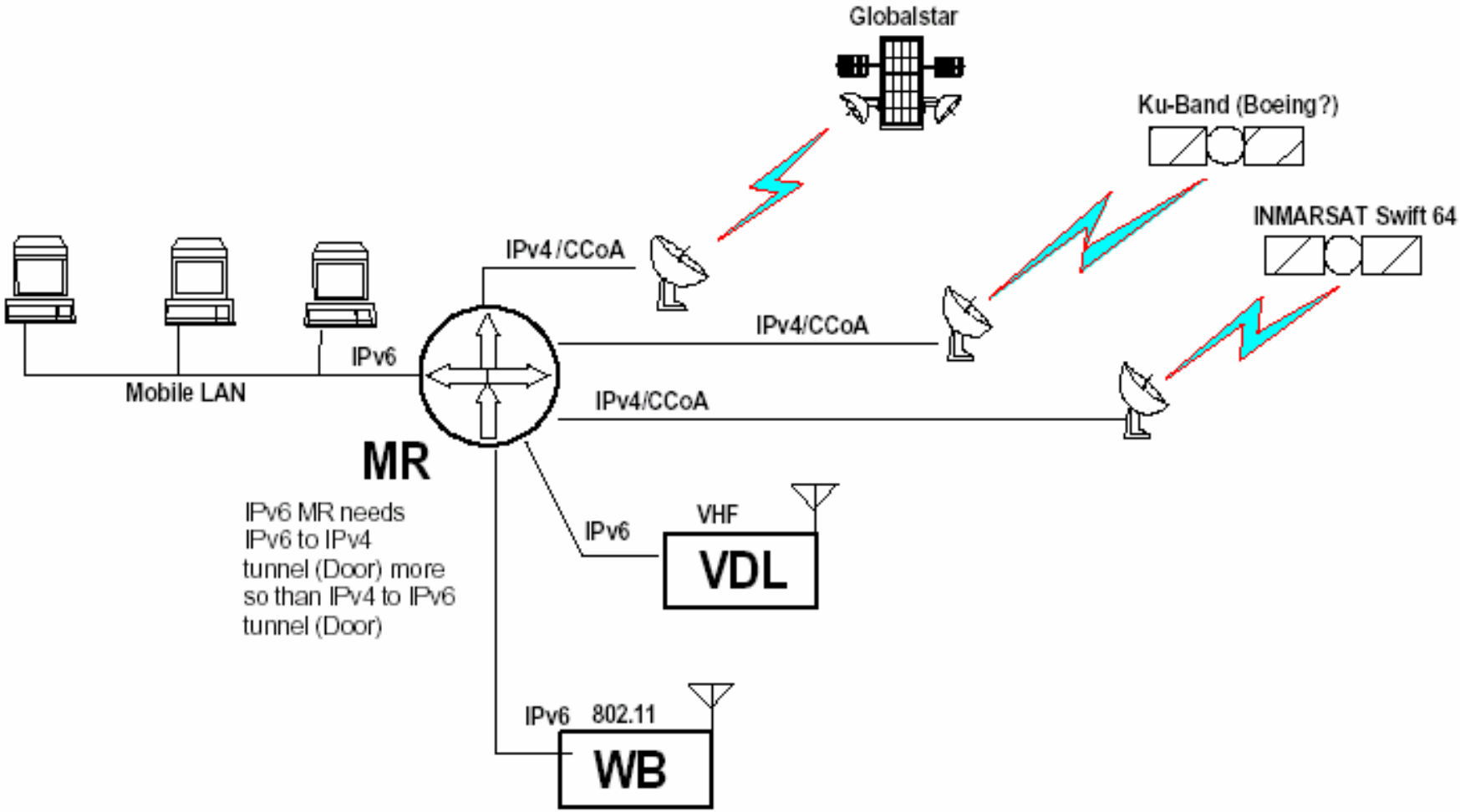

Host from Secured Mobile LAN Accessing Corresponding Private Node via Internal Network
Corresponding Public Node
Public Internet
PROXY
ENCRYPTOR
Home Agent
Private Intranet
Corresponding Private Node
ENCRYPTOR
Secure Mobile LAN
Mobile Router

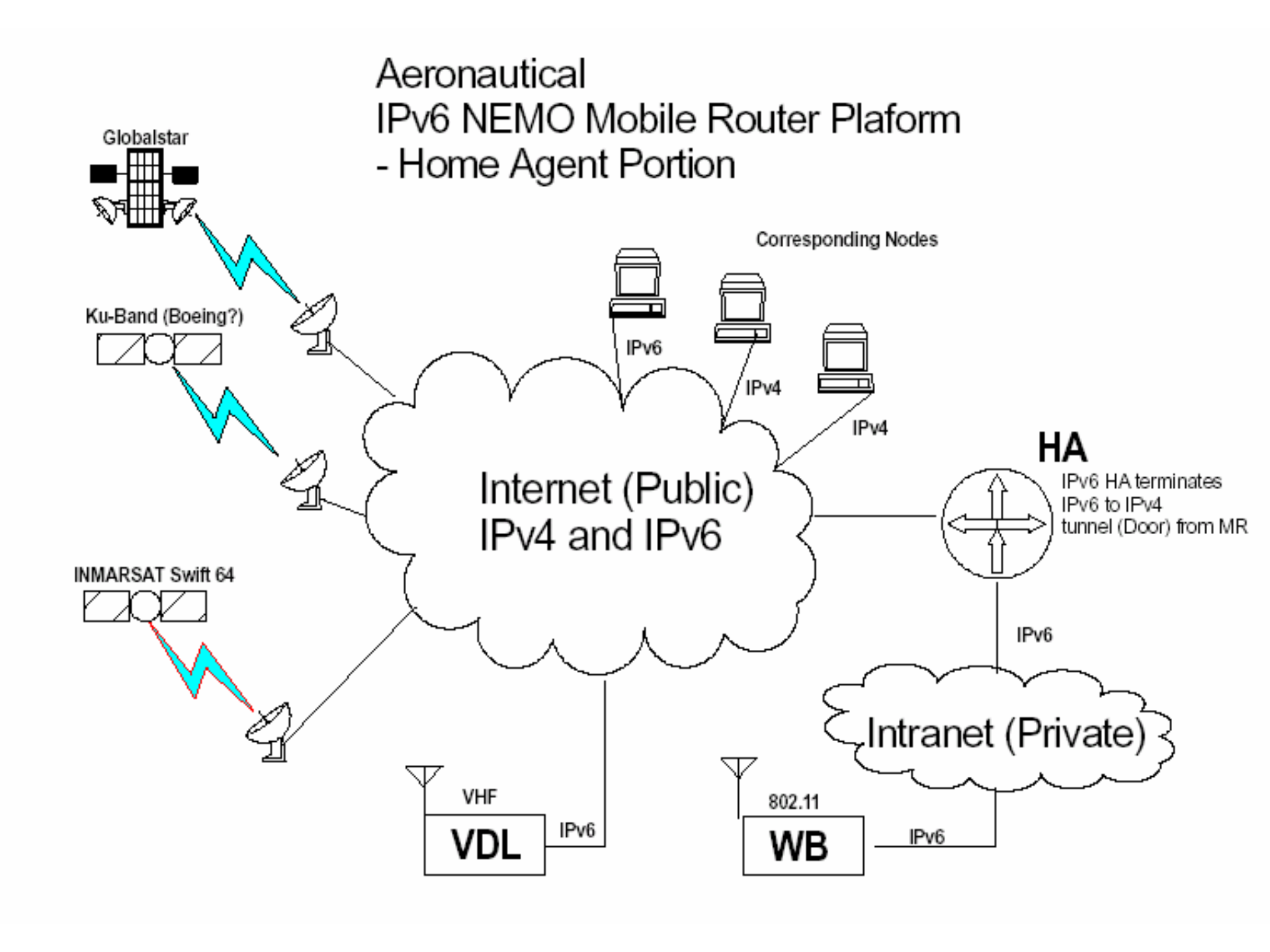

Mobile
Router
ENCRYPTOR
Secured Mobile LAN
Unsecured Mobile LAN
Corresponding
Public Node
Public
Internet
Remote
Controlled
Webcam
PROXY
ENCRYPTOR
Home
Agent
Host from
Unsecured Mobile
LAN
Accessing
Remote Controlled
Camera
Private
Intranet
Corresponding
Private Node

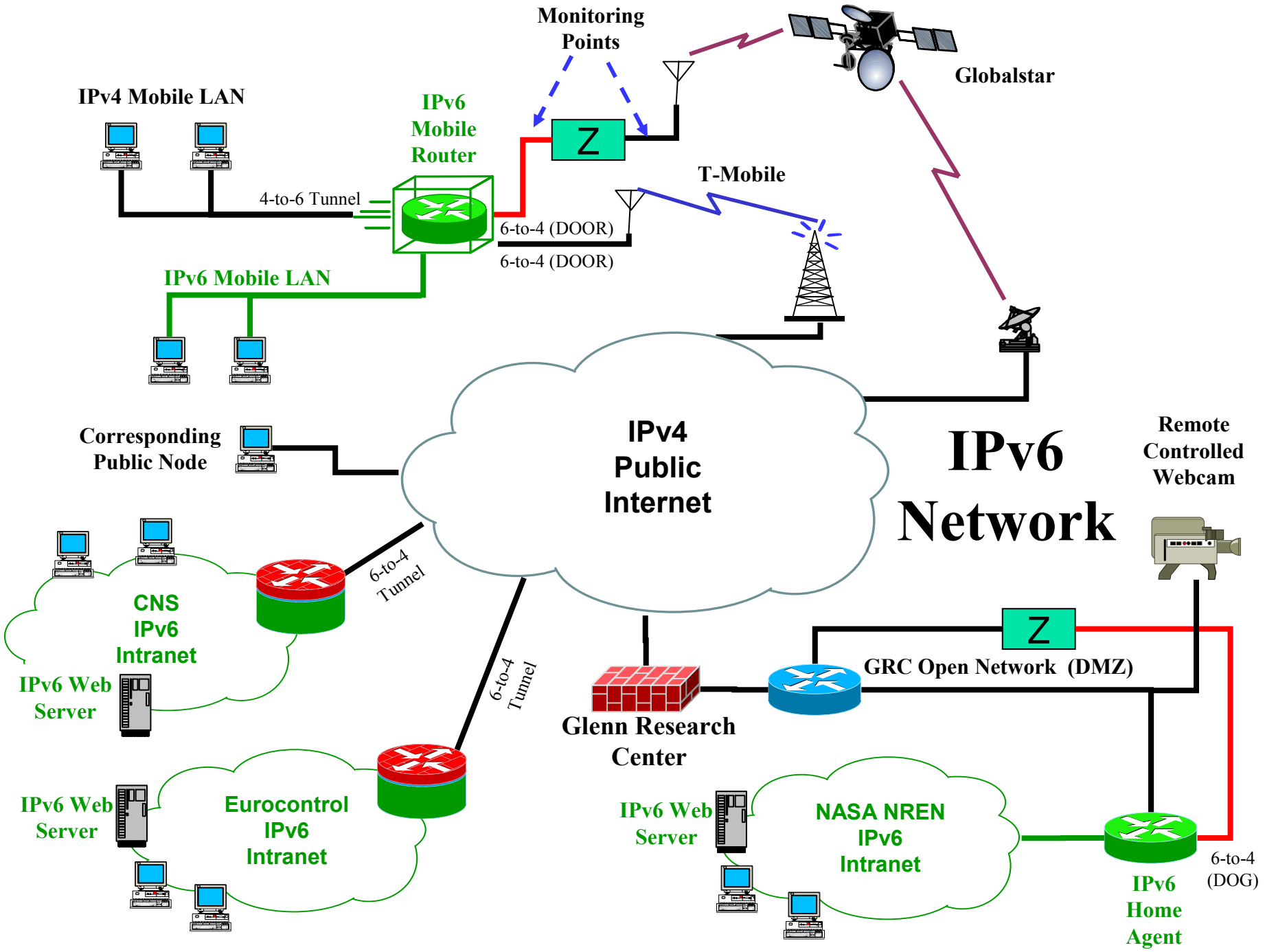

Mobile Router
ENCRYPTOR
Secured Mobile LAN
Corresponding Public Node
Firewall rules block Communication out. Only mobile router tunnels allowed off this subnet.
Public Internet
Remote Controlled Webcam
PROXY
ENCRYPTOR
Home Agent
Host from Unsecured Mobile LAN Accessing Corresponding "Public" Node
Private Intranet
Corresponding Private Node


Mobile Router
ENCRYPTOR
Secured Mobile LAN
Unsecured Mobile LAN
Corresponding Public Node
Remote Controlled Webcam
Firewall rules block Communication. Only IPSec tunnel from "secured mobile LAN" allowed.
Home Agent
Host from Unsecured Mobile LAN Accessing Corresponding "Private" Node
Private Intranet
Corresponding Private Node

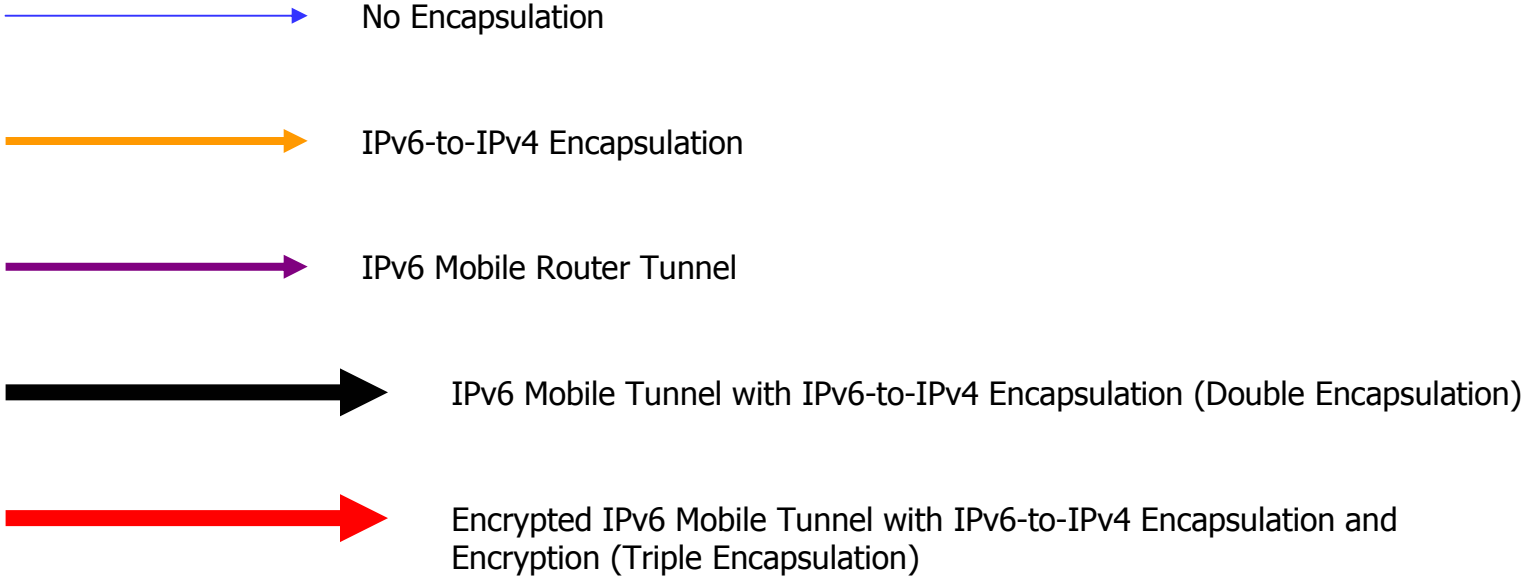
Aeronautical
IPv6 NEMO Mobile Router Plaform
- Mobile Router Portion



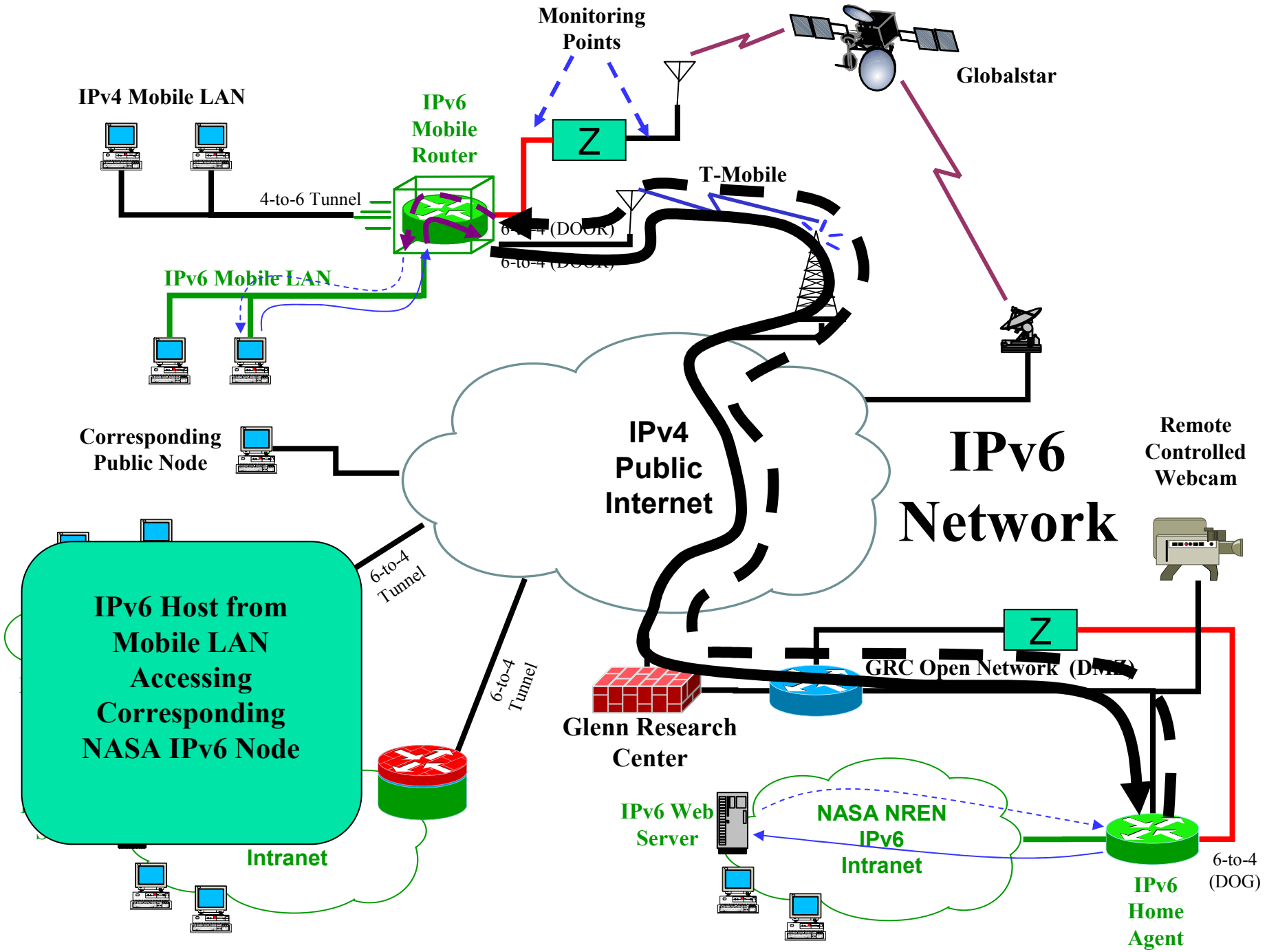

Aeronautical
IPv6 NEMO Mobile Router Plaform
- Home Agent Portion
Globalstar
Ku-Band (Boeing?)
INMARSAT Swift 64
Corresponding Nodes
IPv6
IPv4
IPv4
Internet (Public)
IPv4 and IPv6
HA
IPv6 HA terminates
IPv6 to IPv4
tunnel (Door) from MR
IPv6
Intranet (Private)
VHF
VDL
IPv6
802.11
WB
IPv6


Monitoring Points
Globalstar
IPv4 Mobile LAN
IPv6 Mobile Router
Z
4-to-6 Tunnel
T-Mobile
6-to-4 (DOOR)
6-to-4 (DOOR)
IPv6 Mobile LAN
Corresponding Public Node
IPv4 Public Internet
IPv6 Network
Remote Controlled Webcam
CNS IPv6 Intranet
6-to-4 Tunnel
IPv6 Web Server
6-to-4 Tunnel
Z
GRC Open Network (DMZ)
Glenn Research Center
IPv6 Web Server
Eurocontrol IPv6 Intranet
IPv6 Web Server
NASA NREN IPv6 Intranet
6-to-4 (DOG)
IPv6 Home Agent

Data Flow Key



Note, the Secured IPv4 mobile network data passing through the Globalstar network actually experiences five layers of encapsulation: 1) IPv4-to-IPv6; 2) IPv6 Mobile Tunnel; 3) IPv6-to-IPv4 "Door" tunnel; 4) HAIPE encapsulation for encryption; 5) an additional tunnel between the Globalstar Smiths Falls ground station and the Qualcomm facility in San Diego, CA unencapsulated and reencapsulated for transmission to Glenn Research Center through the NAT at Qualcomm.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IPv4 Mobile LAN
IPv6 Mobile Router
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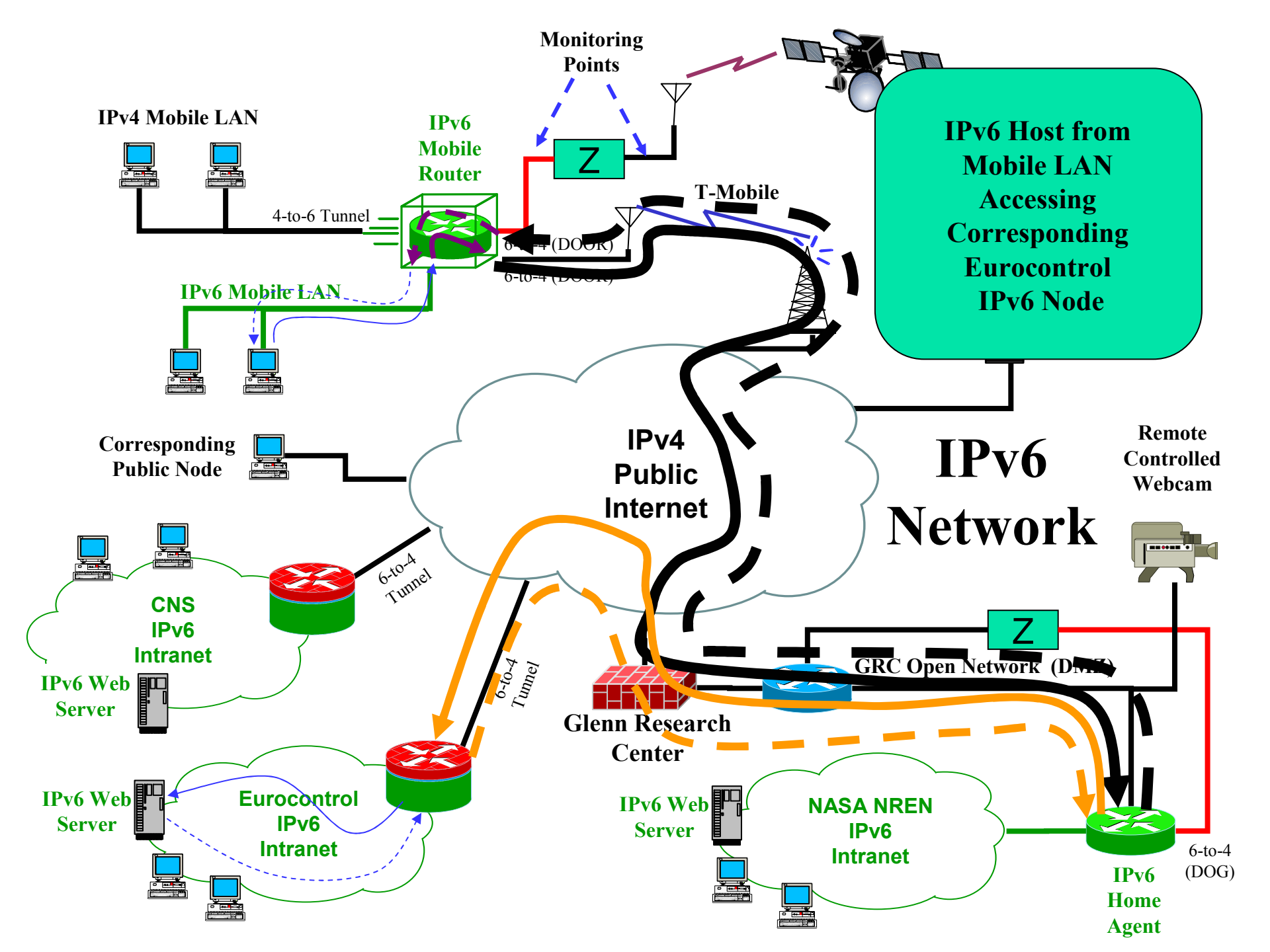
T-Mobile
4-to-6 Tunnel
6-to-4 (DOOR)
IPv6 Mobile LAN
Corresponding Public Node
IPv4 Public Internet
IPv6 Network
Remote Controlled Webcam
IPv6 Host from Mobile LAN Accessing Corresponding NASA IPv6 Node
6-to-4 Tunnel
6-to-4 Tunnel
Z
GRC Open Network (DMZ)
Glenn Research Center
Intranet
IPv6 Web Server
NASA NREN IPv6 Intranet
6-to-4 (DOG)
IPv6 Home Agent


Monitoring Points
IPv4 Mobile LAN
IPv6 Mobile Router
Z
T-Mobile
IPv6 Host from Mobile LAN Accessing Corresponding Eurocontrol IPv6 Node
4-to-6 Tunnel
6-to-4 (DOOR)
6-to-4 (DOOR)
IPv6 Mobile LAN
Corresponding Public Node
IPv4 Public Internet
IPv6 Network
Remote Controlled Webcam
6-to-4 Tunnel
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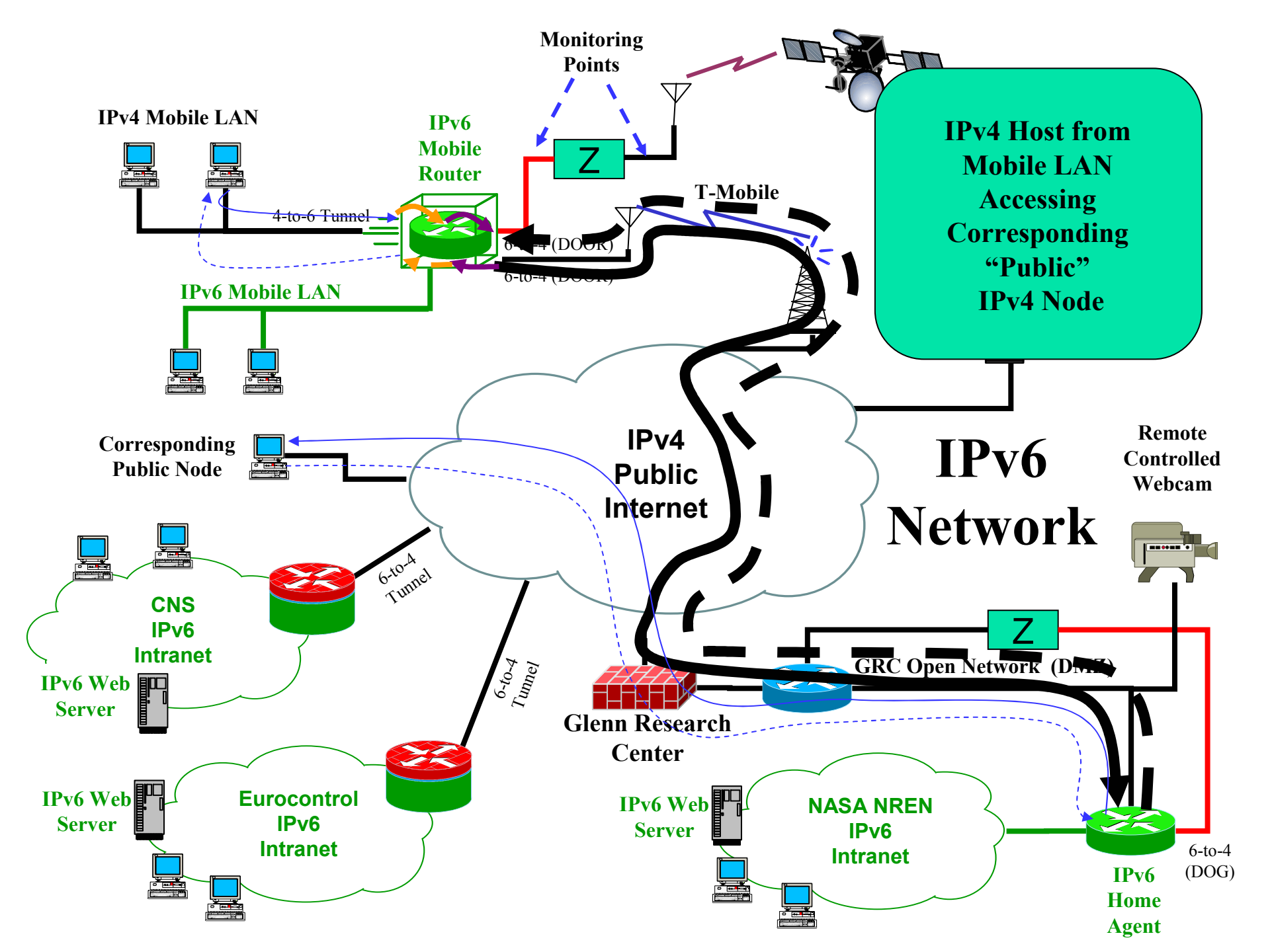
6-to-4 (DOG)
IPv6 Home Agent


Monitoring Points
IPv4 Mobile LAN
IPv6 Mobile Router
Z
T-Mobile
4-to-6 Tunnel
6-to-4 (DOOR)
6-to-4 (DOOR)
IPv6 Mobile LAN
IPv4 Host from Mobile LAN Accessing Corresponding "Public" IPv4 Node
Corresponding Public Node
IPv4 Public Internet
IPv6 Network
Remote Controlled Webcam
CNS IPv6 Intranet
6-to-4 Tunnel
IPv6 Web Server
6-to-4 Tunnel
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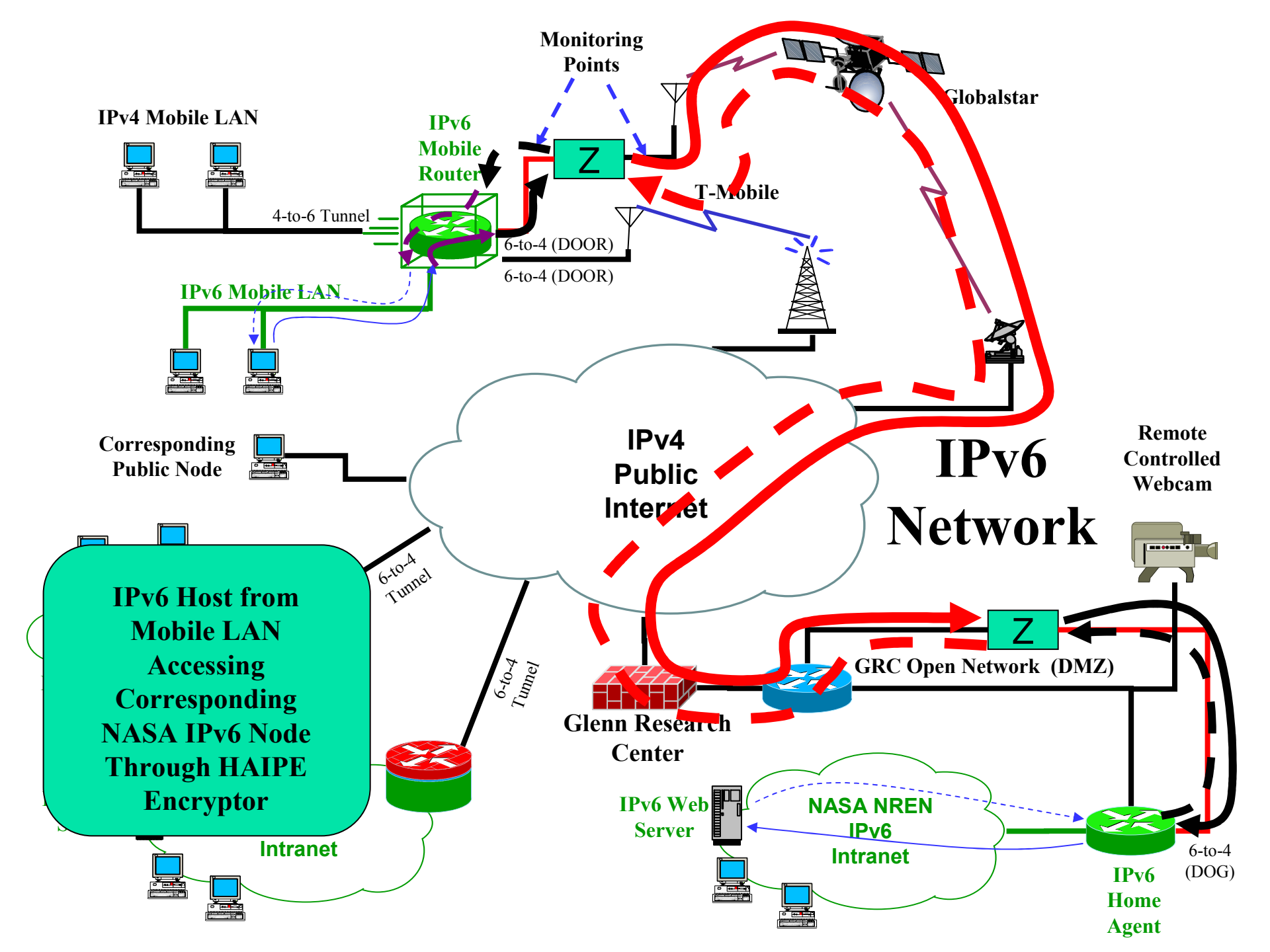
IPv6 Web Server
NASA NREN IPv6 Intranet
6-to-4 (DOG)
IPv6 Home Agent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T-Mobile
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IPv4 Public Internet
IPv6 Network
Remote Controlled Webcam
IPv6 Host from Mobile LAN Accessing Corresponding NASA IPv6 Node Through HAIPE Encryptor
6-to-4 Tunnel
6-to-4 Tunnel
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GRC Open Network (DMZ)
Glenn Research Center
IPv6 Web Server
NASA NREN IPv6 Intranet
Intranet
6-to-4 (DOG)
IPv6 Home Agent

Papers and Presentations

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or

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and pick

“Papers and Presentations”