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# A TINA-based solution for Dynamic VPN Provisioning on heterogeneous networks

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- ✍ TINA concepts
- ✍ IETF Policy Control Architecture

## The design solution

- ✍ VPN representation
- ✍ VPN control architecture

# Premises

## Current technologies

- ✍ Manual configuration
- ✍ Low level interfaces
- ✍ Static VPN definition

## New generation of network devices

- ✍ Policy enabled (e.g. IETF PIB)
- ✍ Active elements (triggering event notifications)

## New management protocols (e.g. IETF COPS)

# Objectives

VPN provisioning as a semi-automated added-value service

- ✍ High level VPN interfaces
- ✍ Dynamic VPN service
  - Policy-enabled
  - Off-the-shelf
- ✍ Transparent to Hybrid networks

# Starting point

## A Provider Architecture for dynamic VPN provisioning

### ✍ Network Architecture

- A modified Virtual Private Routed Network model
- A high level description of VPNs (as an information model)

TINA

### ✍ Control Architecture

- A set of software components to maintain the VPN description and to enforce policies into the physical devices

IETF

# Starting point - TINA Approach-level concepts

Connections as VPN links

Abstraction layering / connection graph

- ✍ Connectivity layer

- ✍ Layer network

as

- ✍ Provider Connectivity View (ConnView)

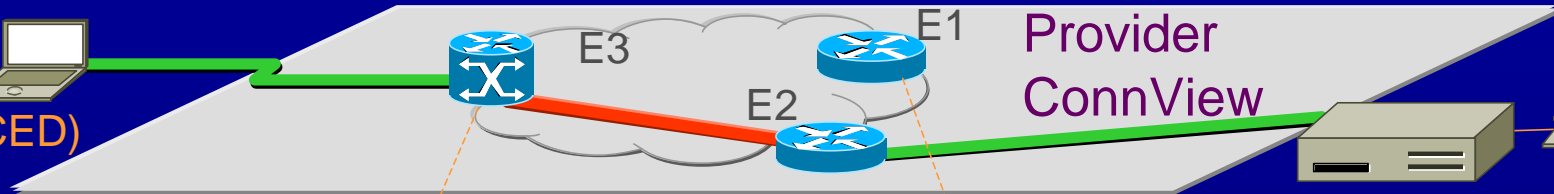
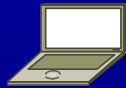
- ✍ Provider Topology

# Applied Approach-level concepts

Customer

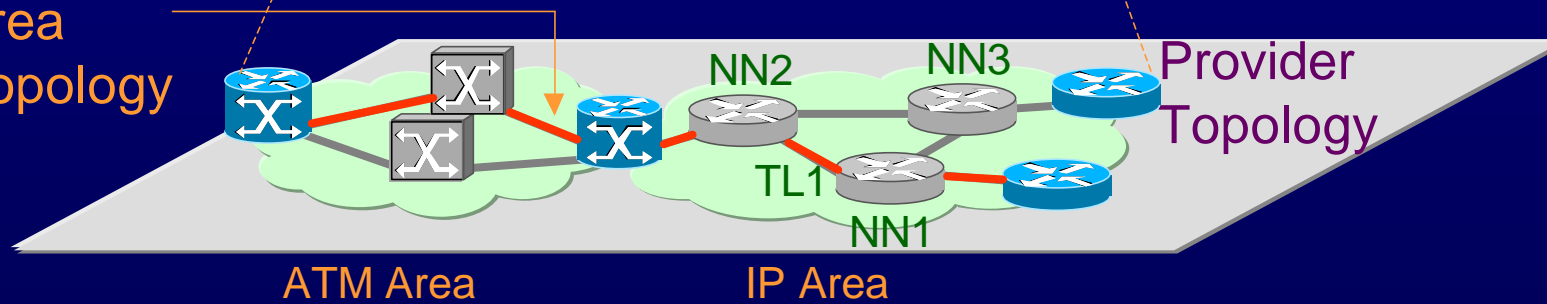
Edge

Device (CED)



CED

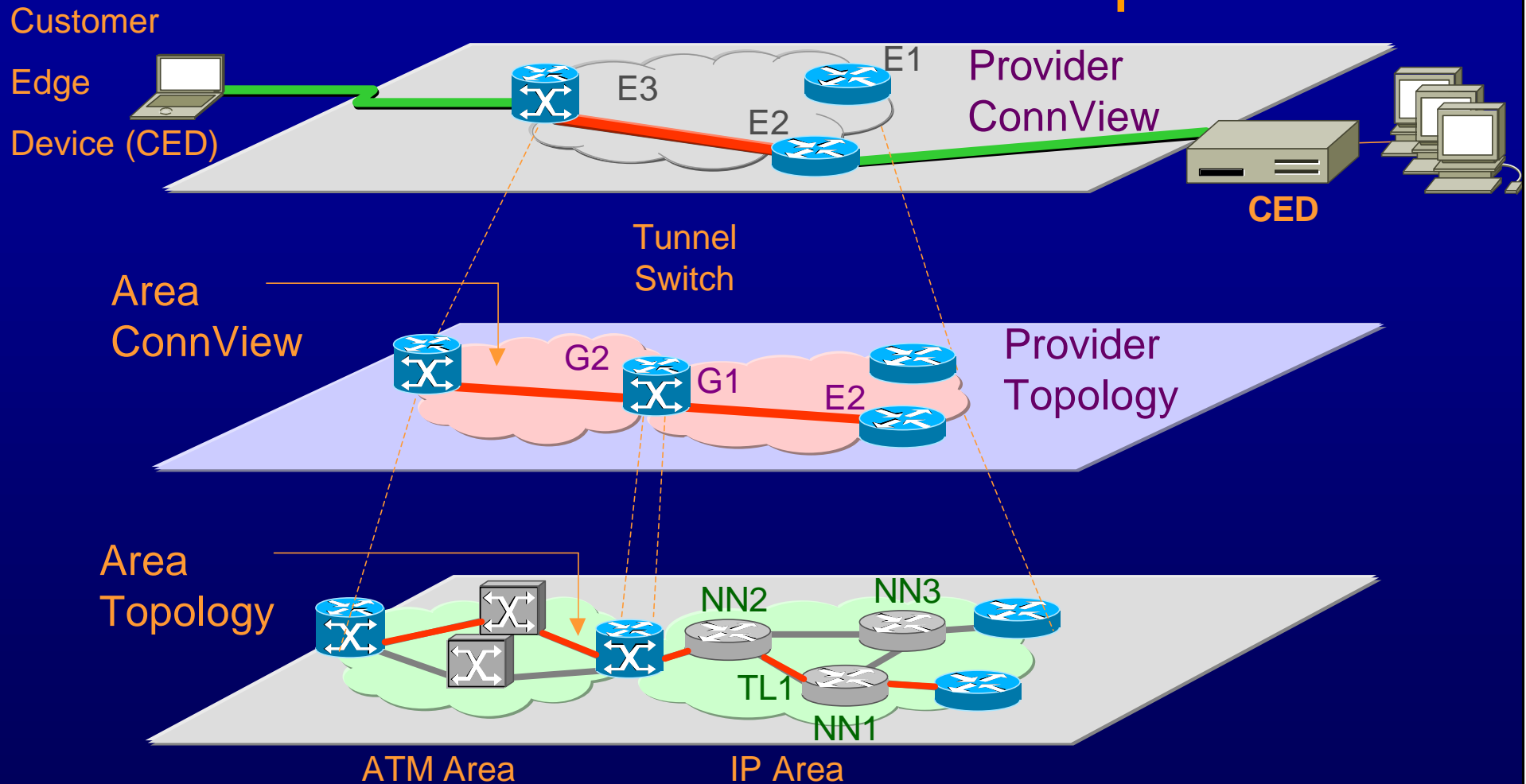
Area  
Topology



ATM Area

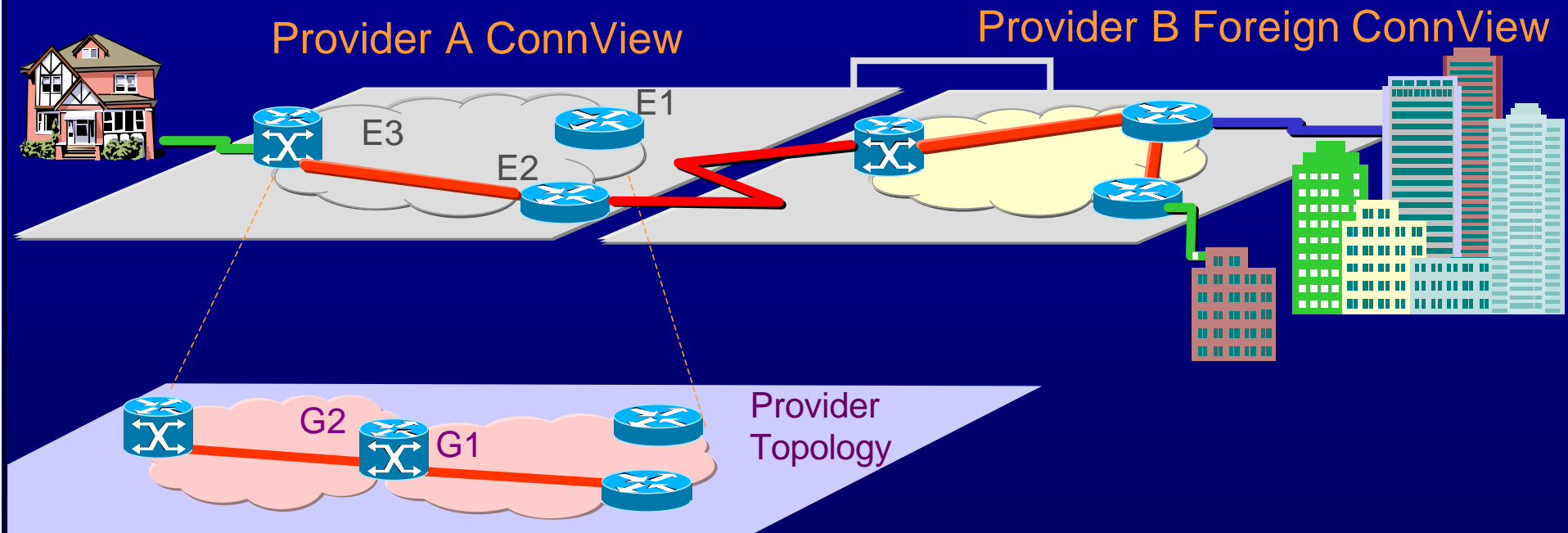
IP Area

# Starting point - TINA Model-level concepts





# Applied TINA Model-level concepts



# Starting point – IETF

## The VPRN (VPN description)

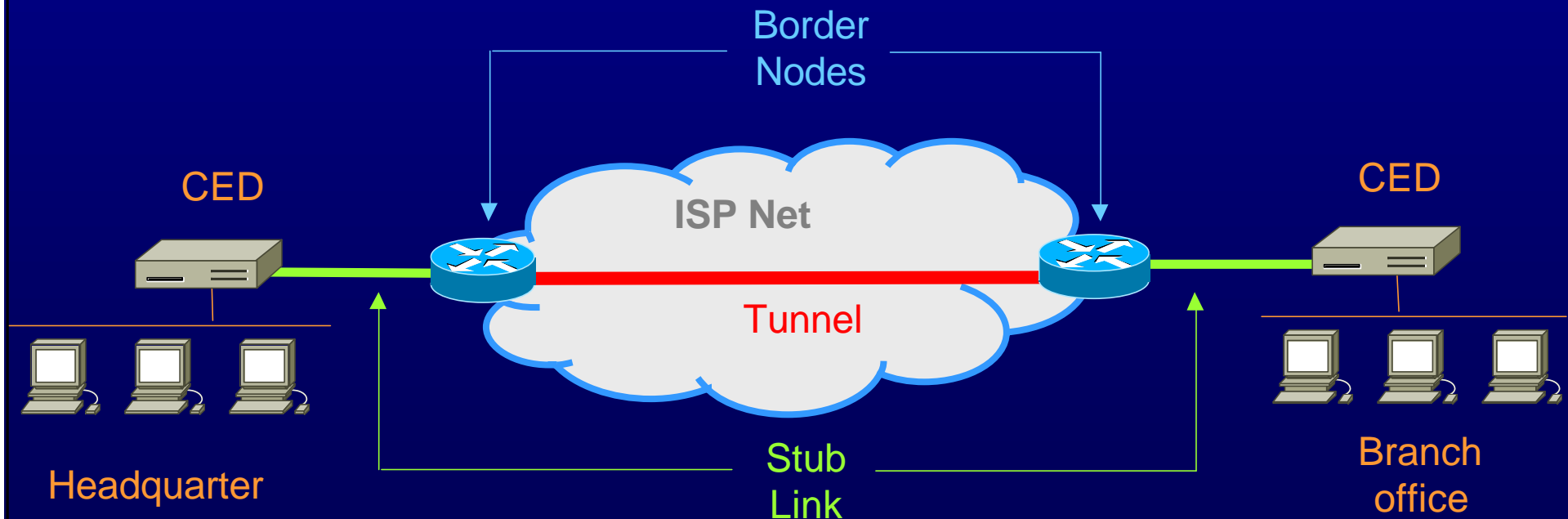
- ✍ IETF Network WG model
- ✍ Extensions
- ✍ VPRN operations

## The Control Architecture (VPN administration)

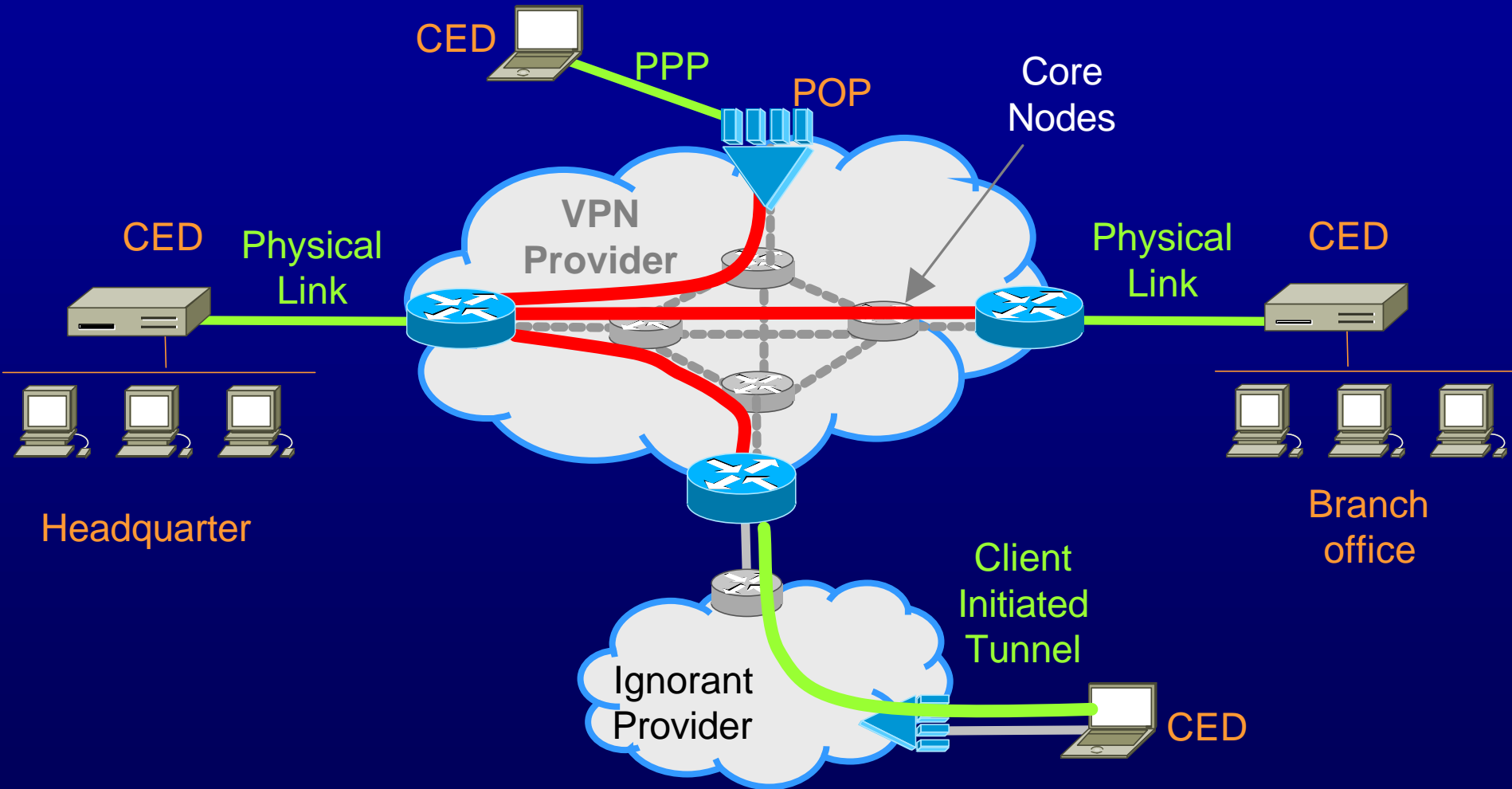
- ✍ The IETF RAP WG model
- ✍ The proposed architecture

# The VPRN model according to IETF

- ✂ ISP as an opaque IP cloud edged by Border Nodes
- ✂ Customer Edge Device
- ✂ Stub link
- ✂ Mesh of tunnels among the border nodes



# Extensions to the VPRN model



# Extensions to the VPRN model

The ISP network is not an opaque cloud

- ✍ Core nodes are integral part of the VPN description
- ✍ The network is structured in areas

We consider also the dial-in customers

- ✍ CED as a single host

A more flexible definition of the Stub Link concept

- ✍ Dedicated, PPP connection, virtual (tunnel)

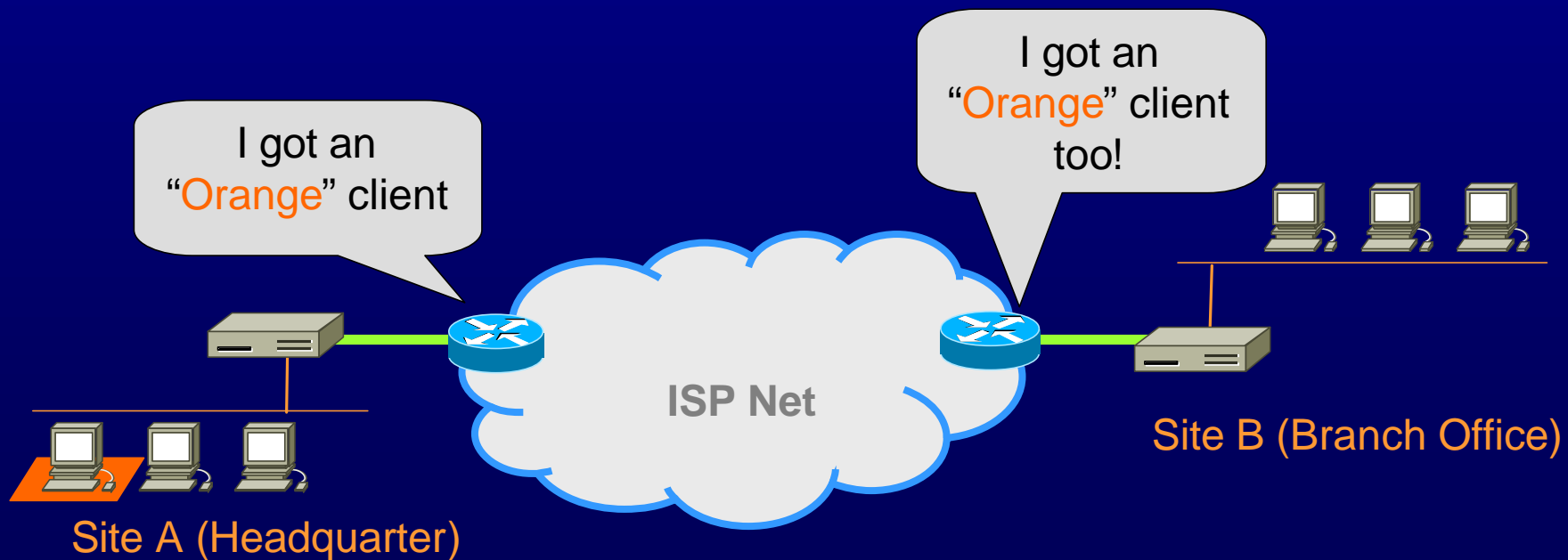
# The 4 operations

- ✍ VPRN membership determination
- ✍ Tunnel establishment
- ✍ Stub link reachability configuration
- ✍ Intra-VPRN reachability info propagation



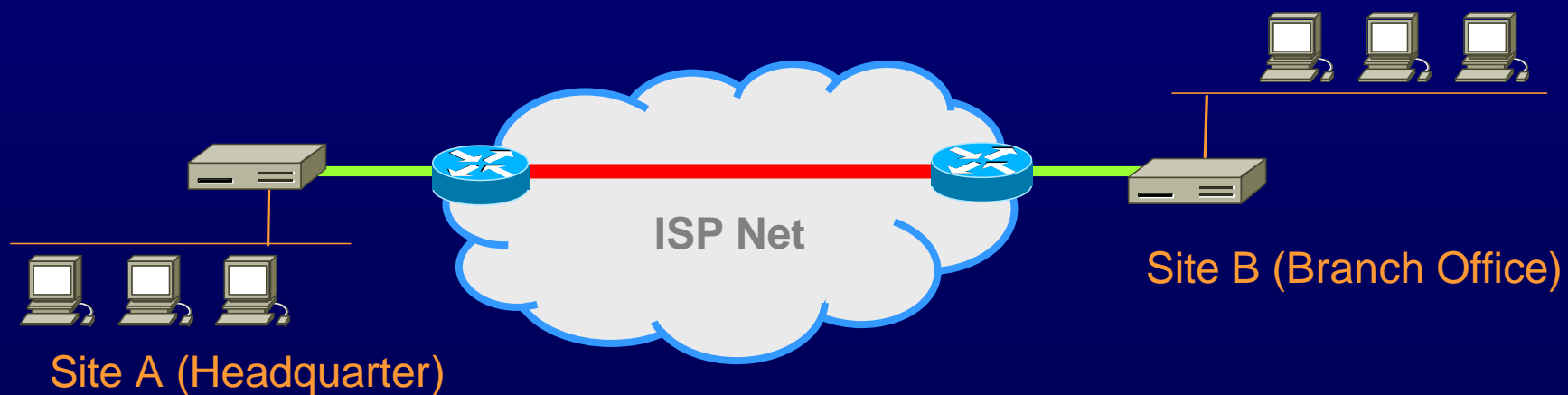
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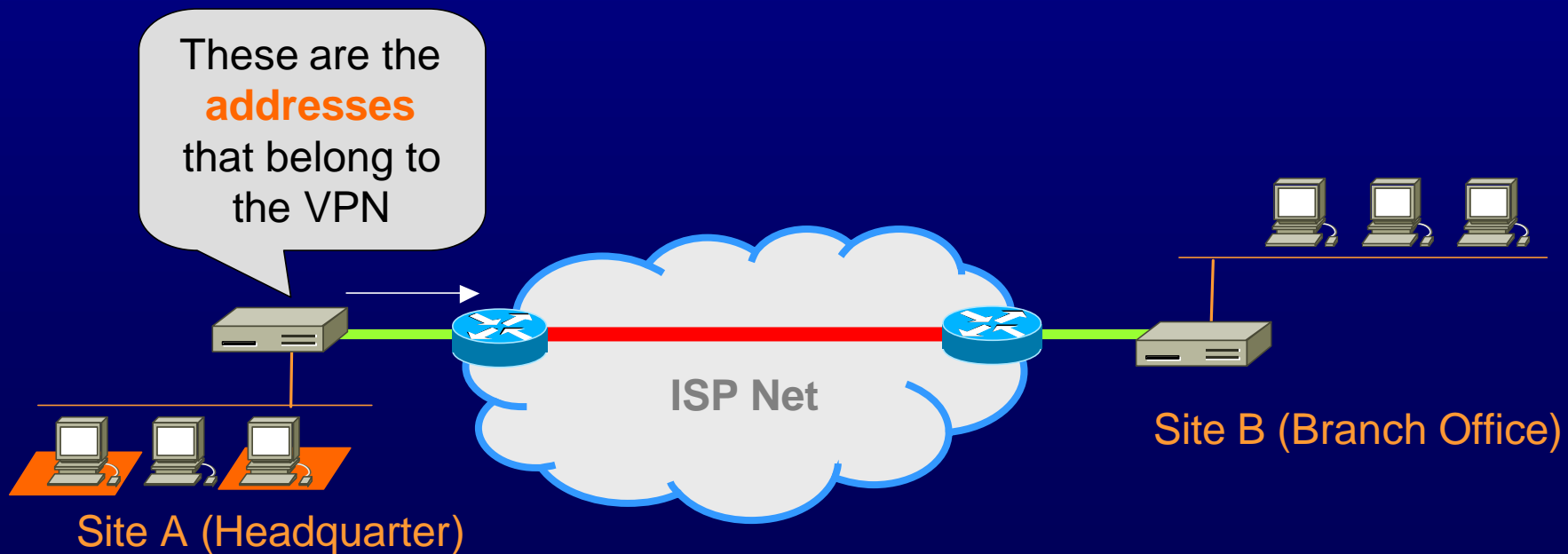
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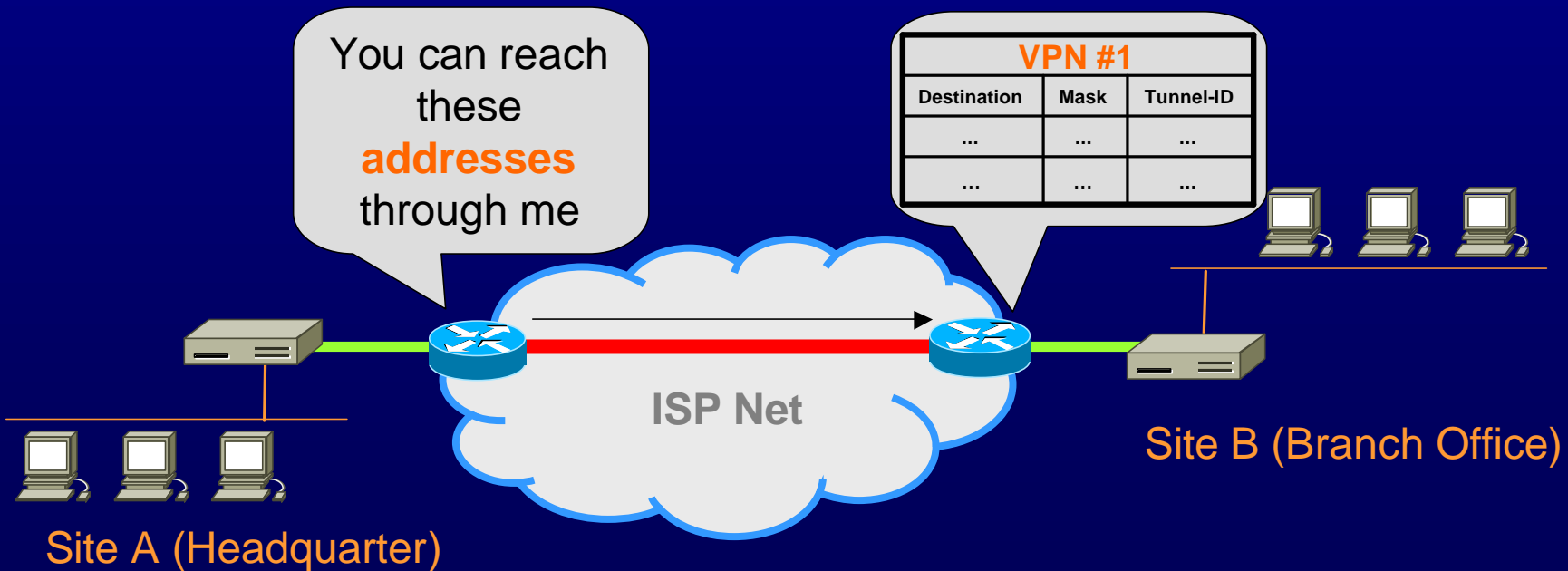
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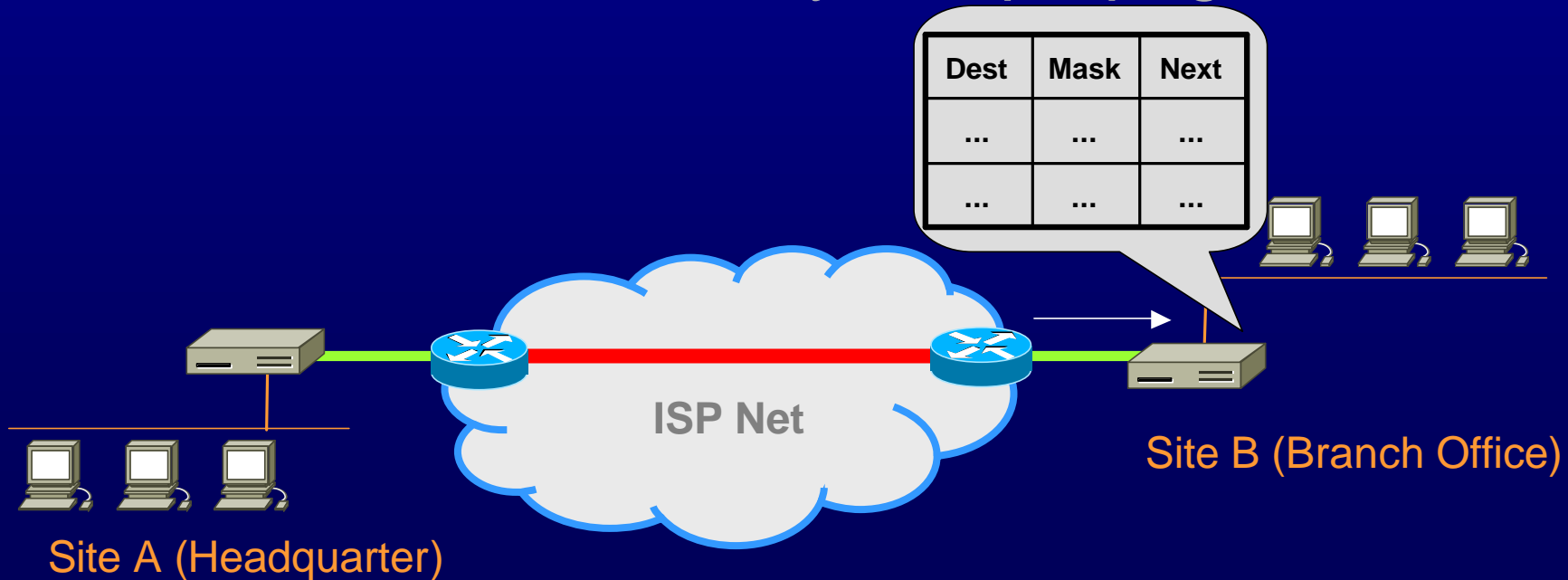
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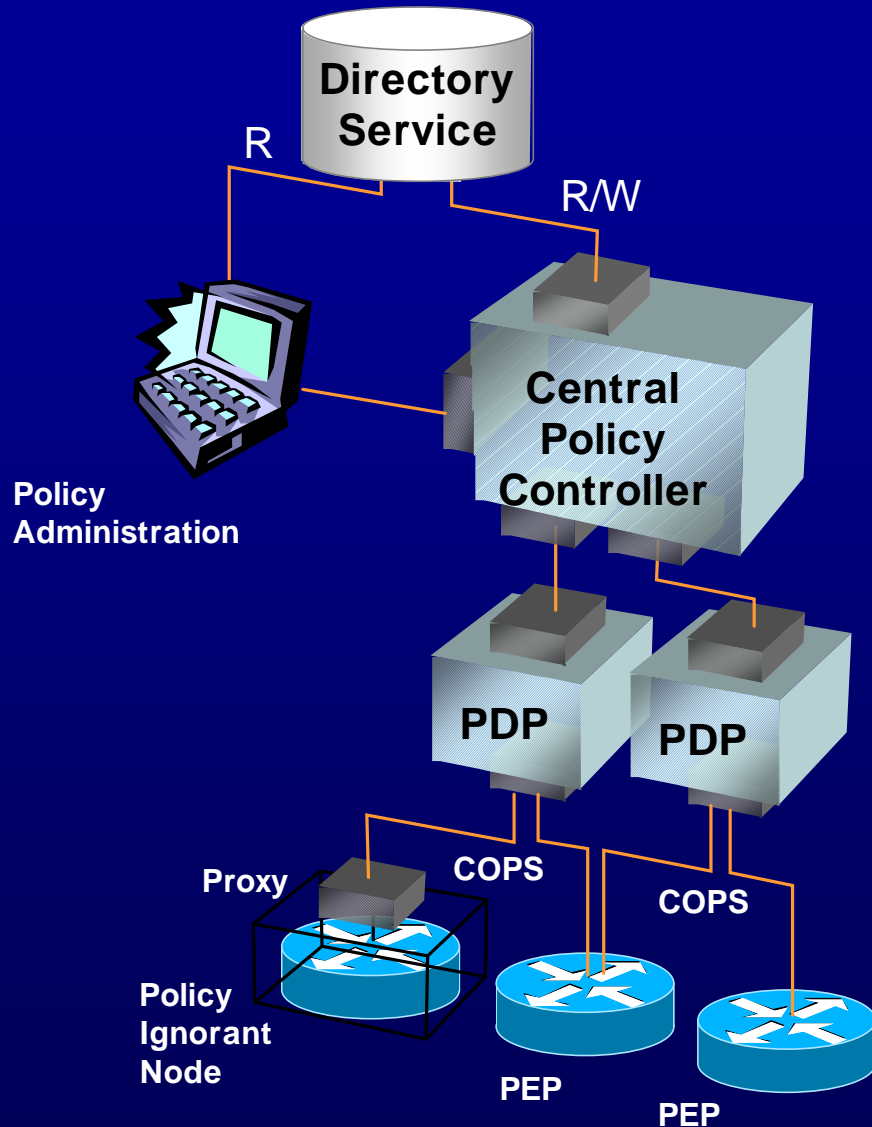


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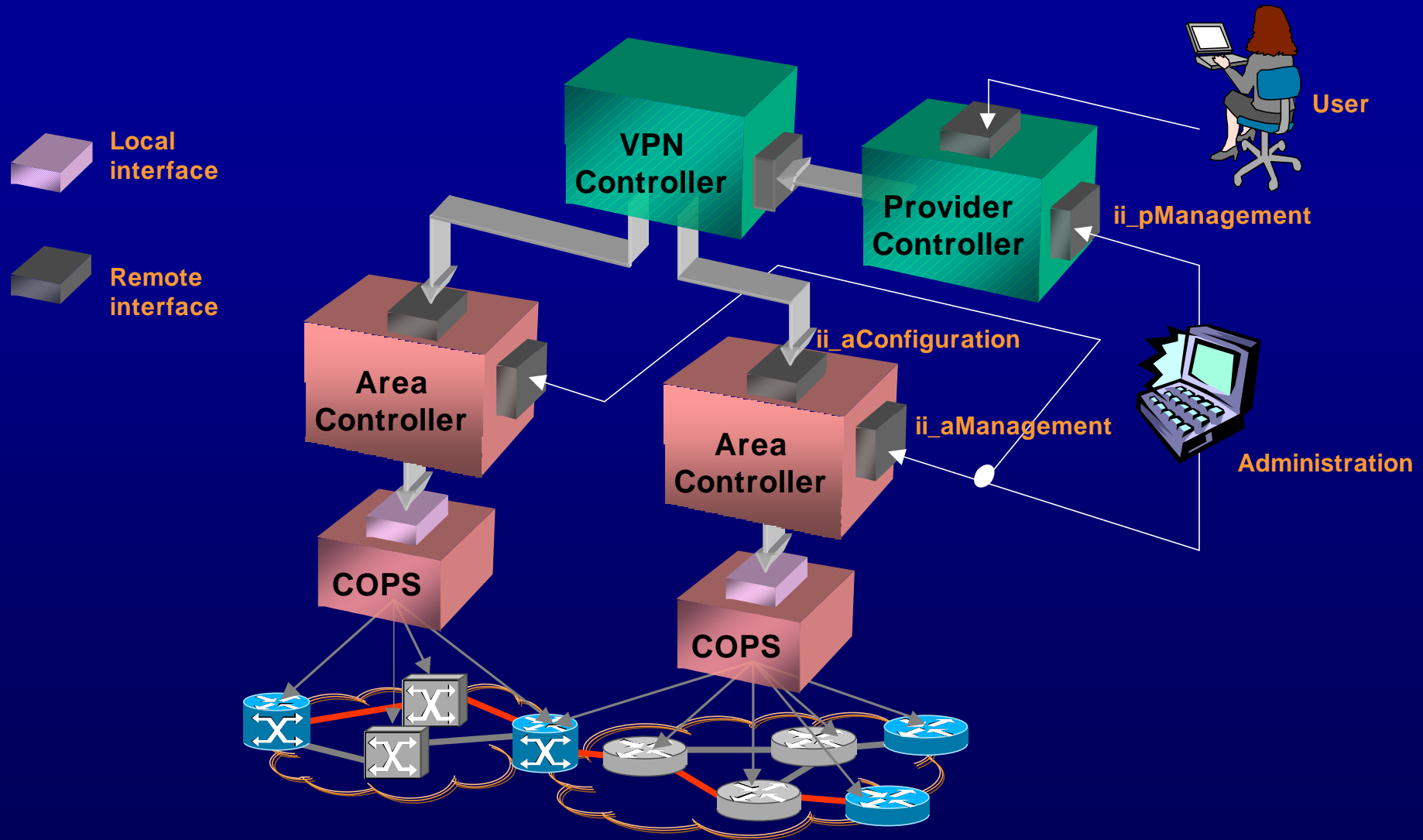


# The policy model according to IETF



- ✍ Policy enforcement coordinated by a central controller (CPC)
- ✍ Storing policies and user info
- ✍ Policies pushed by the Policy Decision Points
- ✍ Policy decisions coded in COPS messages

# The Control Architecture



# Current status

- ✍ VPN graph (information model)
  - To be optimized
- ✍ Test lab implementation of a simplified VPN scenario

