Configuration and Management of Networks

tele1.dee.fct.unl/cgr

Configuration and Management of Networks

Programa

Introdução :

- Arquitecura geral de rede (empresariais, datacenter e Service provider) e tecnologia associada
- Endereçamento L2 e L3 (IPv4 e IPv6)
- Fundamentos de LANs (Ethernet)

Switching (2 Aulas) :

- Domínios de colisão e difusão - VLANs como forma de dividir domínios de colisão.
- Configuração de agregados de Links com EtherChannel.
- Configuração de trunks para transporte de várias VLANs.
- As várias versões e configuração do protocolo Spanning tree (STP).
- Encaminhamento entre VLANs usando routers or multilayer switches.

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Encaminhamento (3,5 aulas):

- EIGRP Desenho, configuração e verificação
- OSPF Desenho, configuração e verificação
- Route maps, access control lists e prefix lists
- BGP Desenho, configuração e verificação

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Service Provider Networks (1 Aula)) :

- Redes de Accesso Ethernet: 802.1.ad e 802.1ah
- MPLS based services, VPNs Layer 2 e Layer 3.
- Exemplos de Serviços.

Software defined Networks / Network Function Virtualization (NFV) (3 Aulas)

- Separação entre control plane e forwarding plane
- Os vários "tipos" de SDN – NETCONF/RESTCONF/YANG ; BGP-LS; APIC ; Openflow; P4.
- O standard Open Flow nas várias versões.
- Papel das tecnologias SDN e NFV nas redes 5G.
- NFV - conceito base.
- NFV - Gestão e orquestração.

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Avaliação :

1º Trabalho – Configuração de cenários de rede em Common Line Interface CLI (Cisco IOS). **– 25 %** (~até 29 de Outubro 5 aulas)

2º Trabalho – Programação de uma rede virtual (Mininet) usando um controlador OpenFlow (Floodlight) **- 25%** (~até 10 de Dezembro 5 aulas)

Cisco CML https://devnetsandbox.cisco.com/

Mininet http://mininet.org/

Controlador Floodlight
http://www.projectfloodlight.org/floodlight/

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Avaliação :

Teste teórico – Redes empresariais, switching e endereçamento, EIGRP, OSPF **25% - 16 Outubro (data provisória)**

Teste teórico –, BGP, Service Provider Networks e SDNs – 27 **November (data provisória) 25%**

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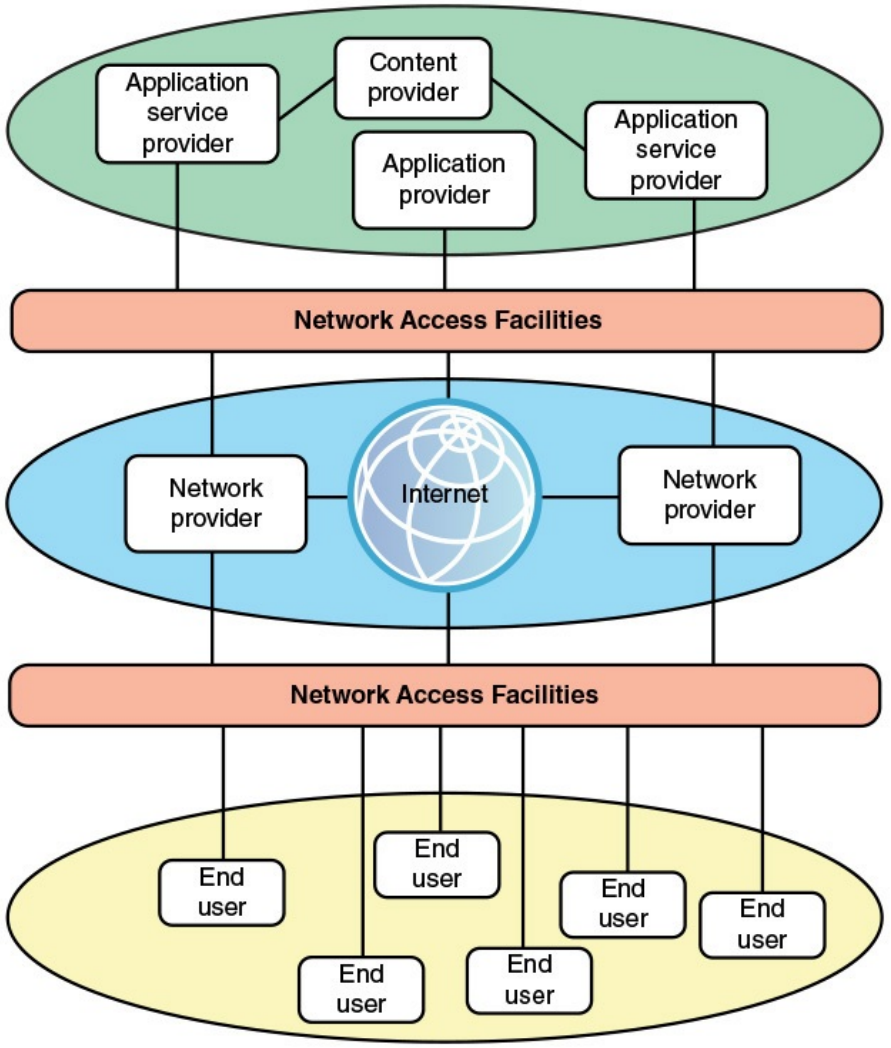
Modern Network Ecosystem:



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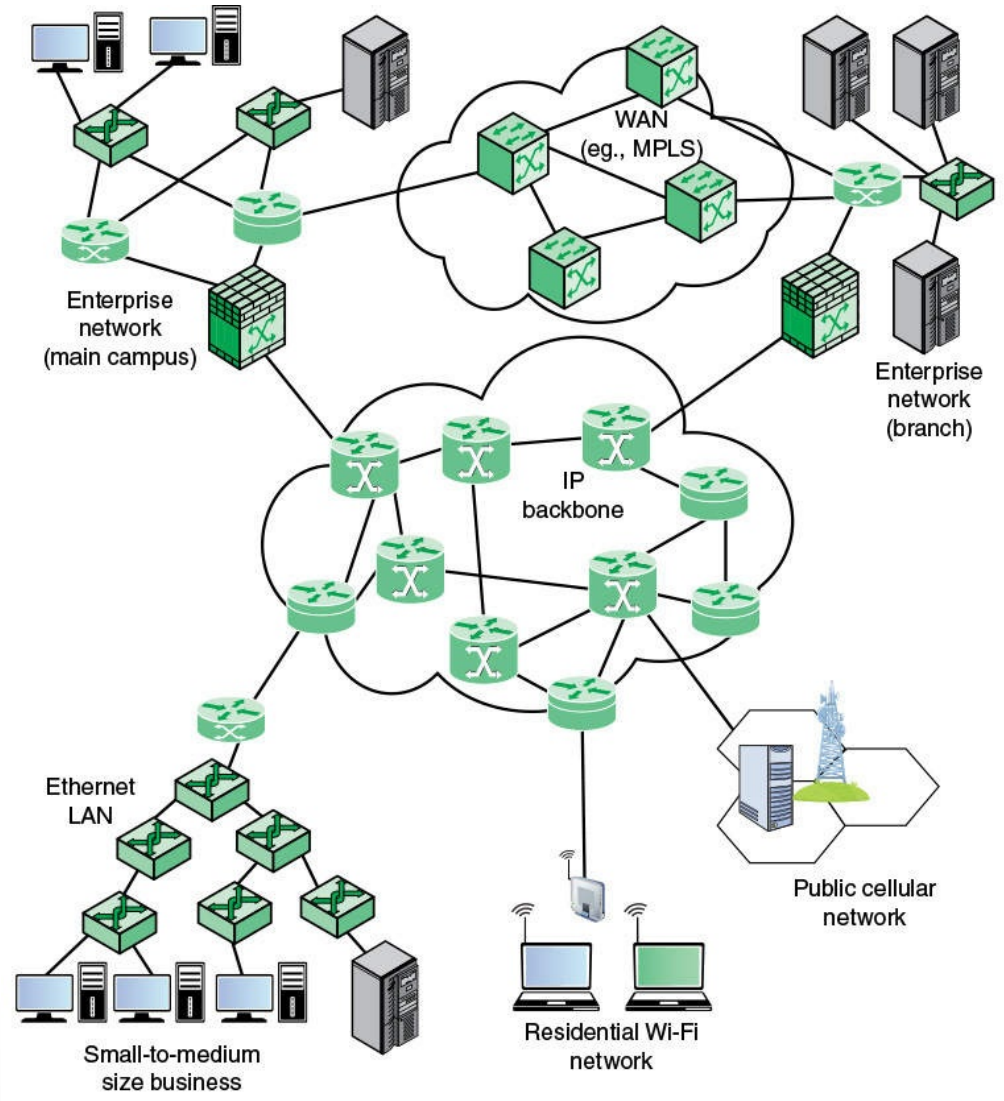
Global Network Architecture:



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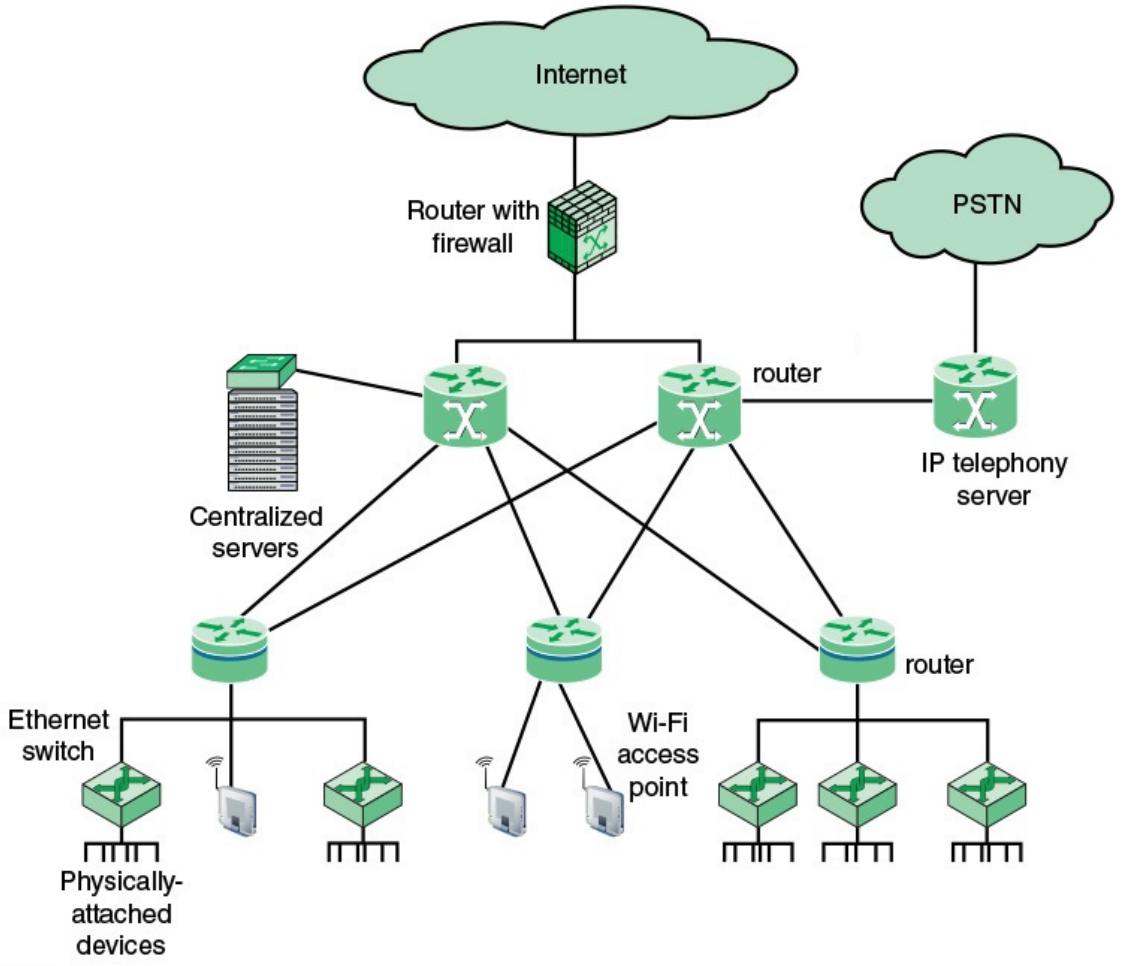
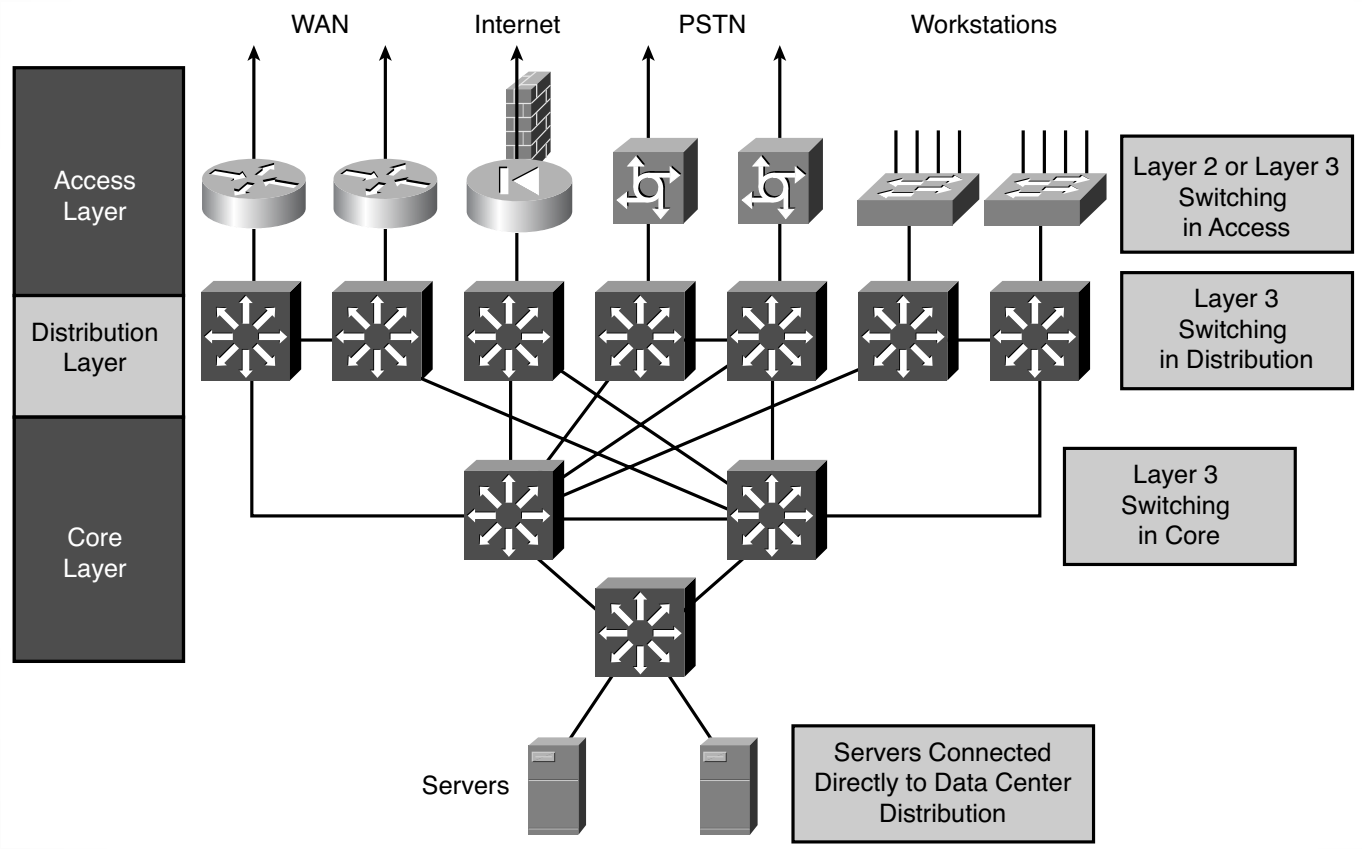
Basic Enterprise/Campus Network:



Enterprise Networks - The Hierarchical Model



The Hierarchical Network Model

Access layer: The first tier or edge of the campus. It is the place where end devices (such as PCs, printers, cameras, and so on) attach to the wired portion of the campus network.

Distribution layer: In the campus design, this layer has a unique role in that it acts as a services and control boundary between the access and the core. Aggregation point for all the access switches, providing connectivity and policy services for traffic flows within the access-distribution block.

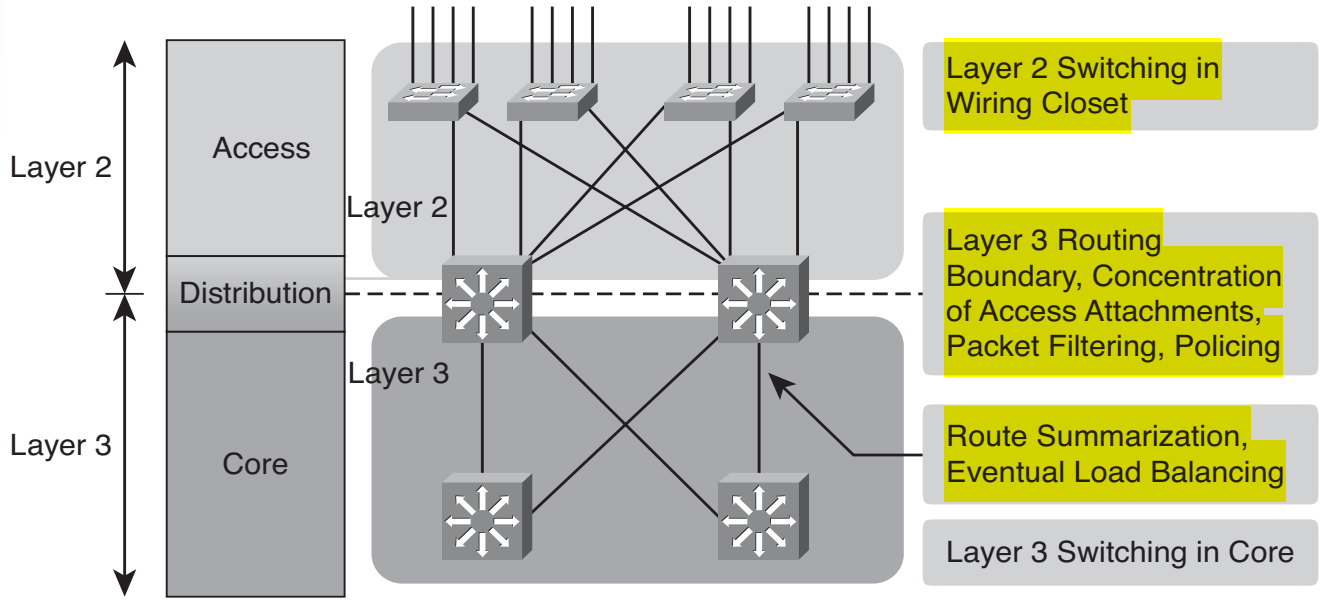
Core layer: In some ways, this layer is the simplest, yet most critical, part of the campus. It provides a limited set of services and is designed to be highly available and operate in an always-on mode.

Access Layer Functionality

Provides end-device connectivity

- Supports the connectivity of any end devices it can also extend the network out one more level (IP phones and wireless APs are key examples of this).
- In the WAN environment, the access layer provides remote users or sites with access to the campus network through a wide-area technology such as MPLS or SD-WAN.
- Access is granted only to authenticated users or devices.
- Provides QoS and policy application.

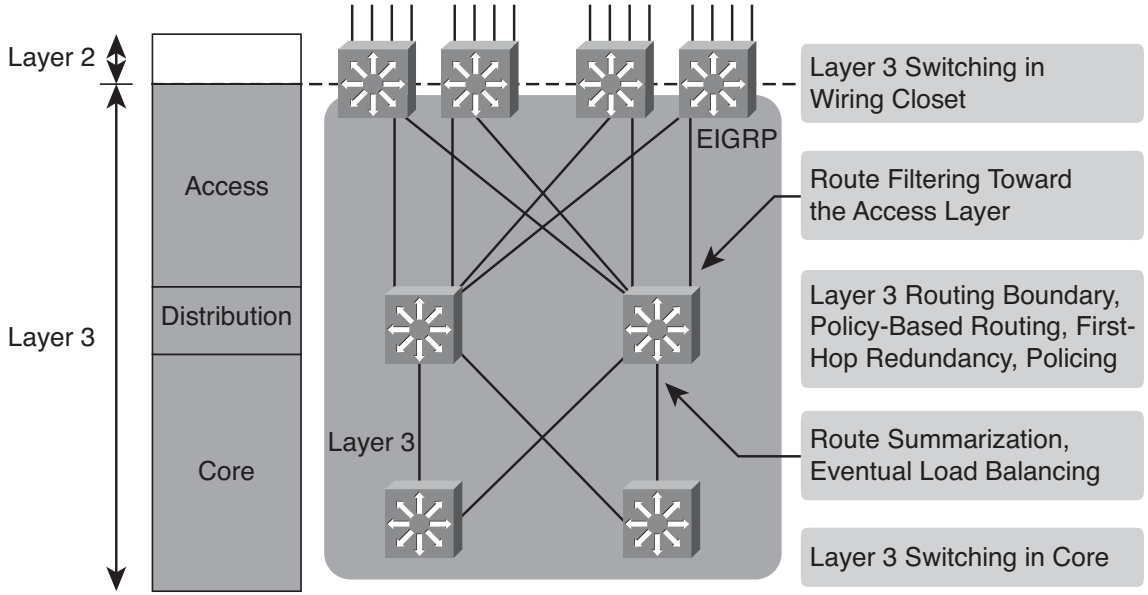
L2 – L3 Boundary at distribution Layer



- Access with Layer 2 switches with high-speed trunk ports towards distribution
- The distribution switches:
  - Layer 2 switching on downstream towards access.
  - Layer 3 switching on upstream ports towards the core.
- Route summarization is configured on interfaces toward the core layer.

L2 – L3 Boundary at access Layer

Routed Network



- Access with Layer 3 switches
- The distribution uses Layer 3 switches
- Route filtering in interface towards Access
- Route summarization is configured on interfaces toward the core layer.

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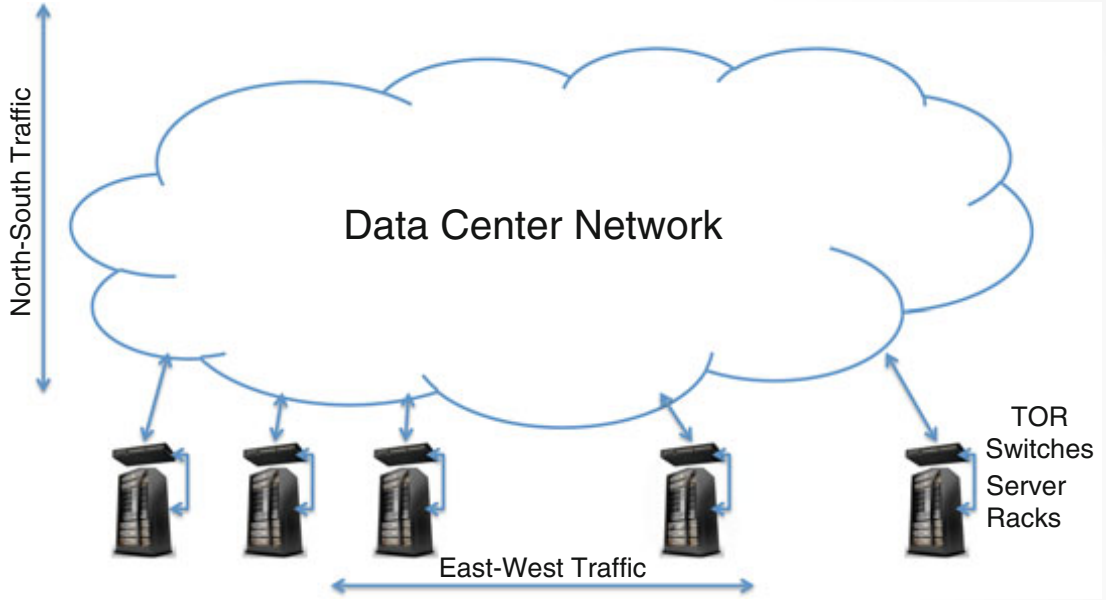
Data center Networks

Typical Data center

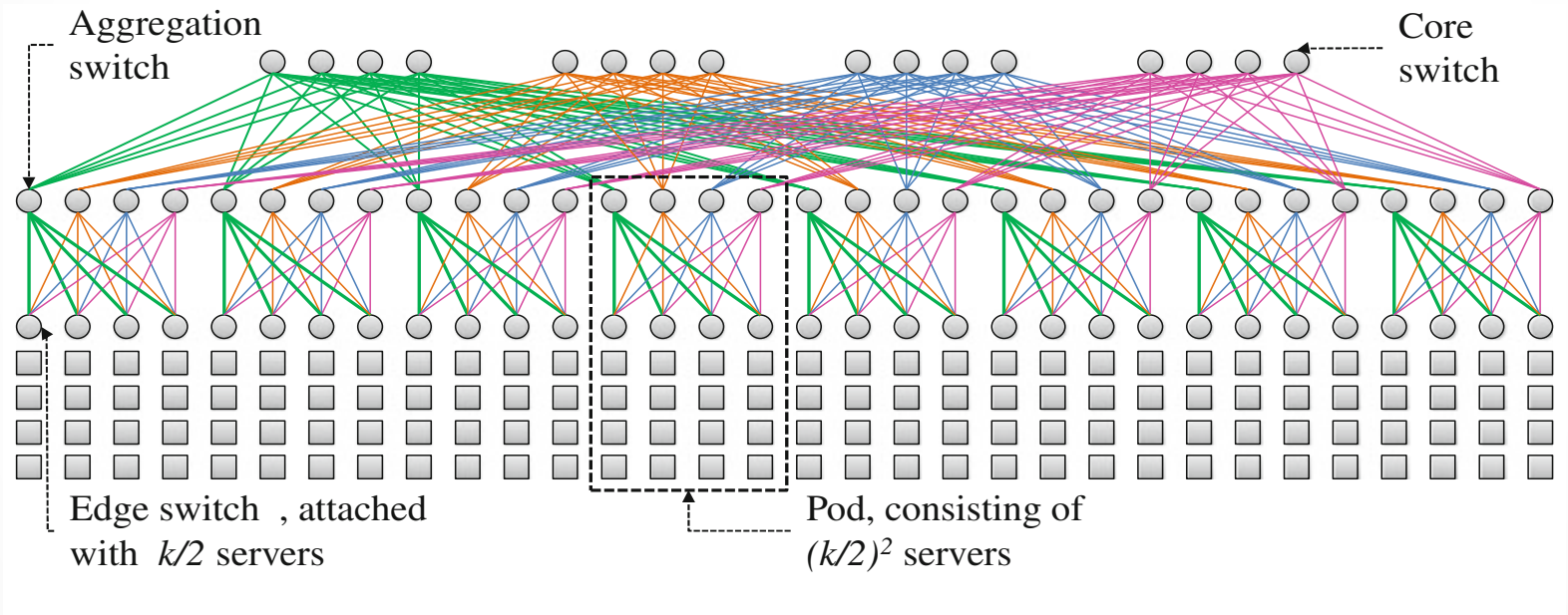


Network requirements:

- Any VM may migrate to any physical machine without the need for a change in its IP address
- Any end host should efficiently communicate with any other end host through any available paths
- No forwarding loops
- Quick Failure detection

Data center Networks

Most common topologies are hierarchical multi-rooted trees:



Service Provider Networks 4G.

Residential Services

A popular strategy to maximize service revenues and minimize subscriber turnover is to offer a complete set of bundled triple-play services to residential subscribers that include:

- Voice
- High-speed Internet
- Broadcast TV and Video On Demand (VoD)

Business Services

Business subscribers are an important segment of many service providers' customer base. The main business services that must be provided by the network today are:

- MPLS VPN
- Carrier Ethernet connectivity
- Managed services

Mobile Backhaul

Provide robust and flexible IP transport networks to mobile service providers

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Service Provider Networks next generation.