思科网络虚拟化(nV)技术介绍

议题

- ASR 9000 网络虚拟化技术总体介绍
- 网络虚拟化技术实现
- nV 技术在城域网中的应用

下一代因特网构架及发展趋势

ASR 9000 汇聚层nV 网络虚拟化概述

Before: *nV* Technology

每台设备需要单独管理

变换和汇聚节点功能不一致影响业务开展.

业务提供，运维，管理成本居高不下

节点故障保护难题

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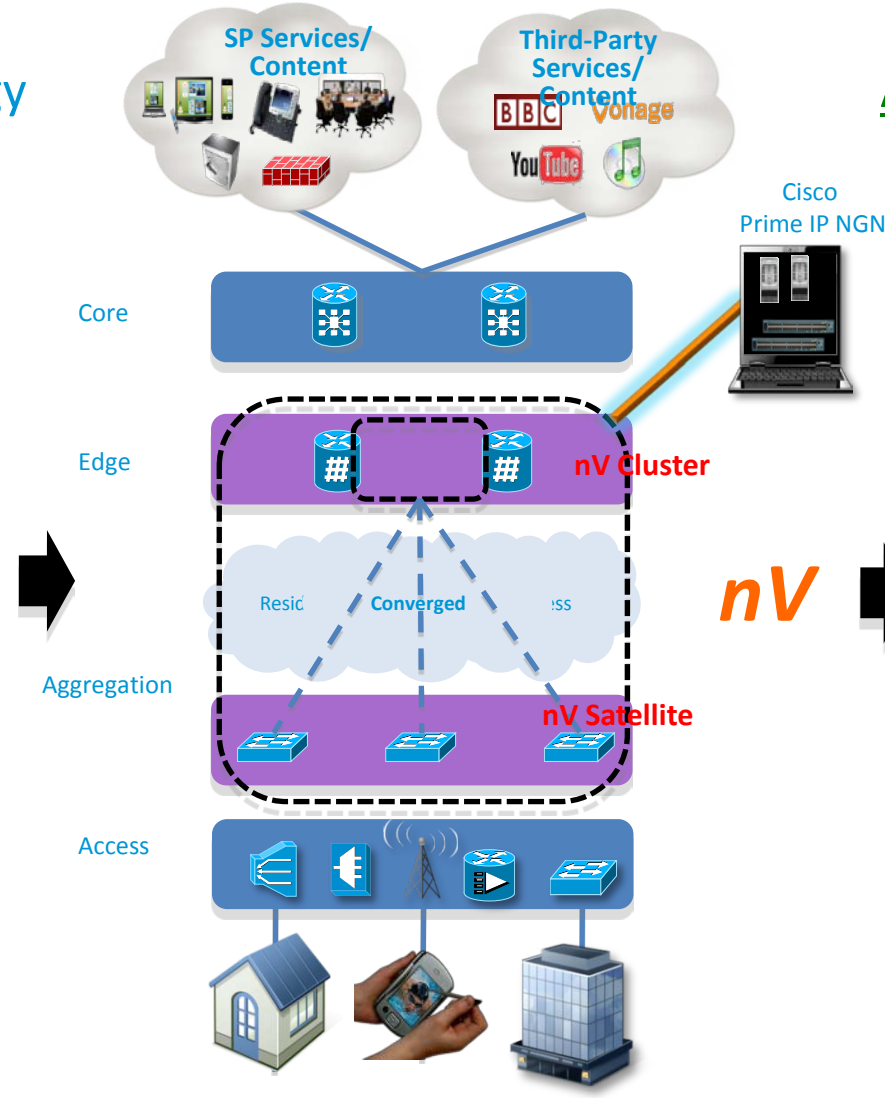
端口密度和扩展性无法突破



nV

After: *nV* Technology

两台边缘设备，以及边缘和会汇聚设备融合成单一设备.

一致的软件功能，一致的业务能力.

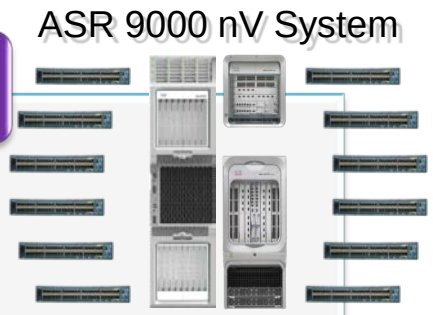
简化网元设置，节省75%的运维费用

完全客服边缘和汇聚节点的保护问题，不需要运行任何协议，简单，有效

一个虚拟系统最多扩展到84,480个GE

@FCS, 支持24 satellite per ASR9K

创新的nV技术带来网络变革



同时实现简单的网络结构和完善的可靠性

- Built-in system infrastructure for network dual-homing
- Service scale independently convergence
- Sub 50msec convergence time*

大大扩展了网络设备的端口容量

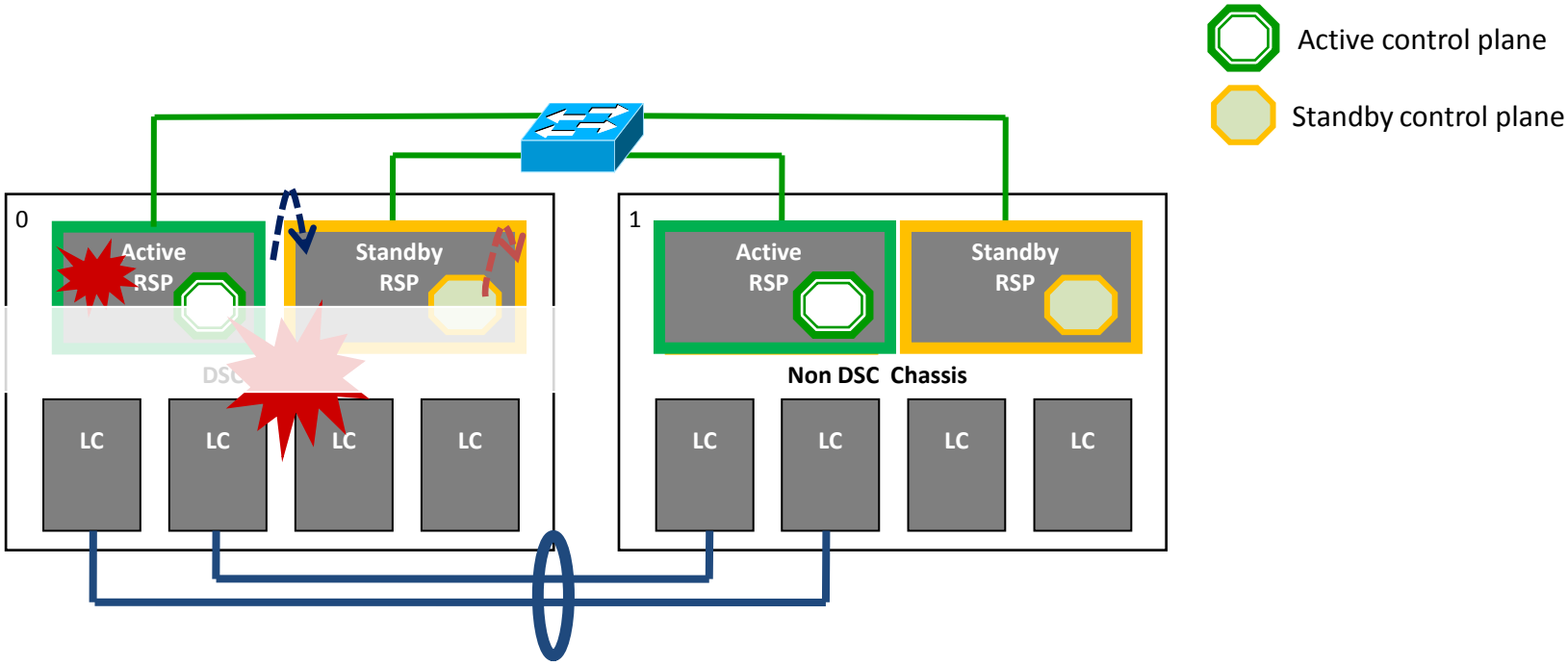
- Increase node capacity by clustering physical chassis together
- Single control and management plane, without introducing operational complexity

网络管理和维护更加简便，实现网络扁平化

- nV Edge + nV Satellite
- Super network resiliency, capacity, GE density, Simple operation and single software feature set

* Convergence also depends on the peer device

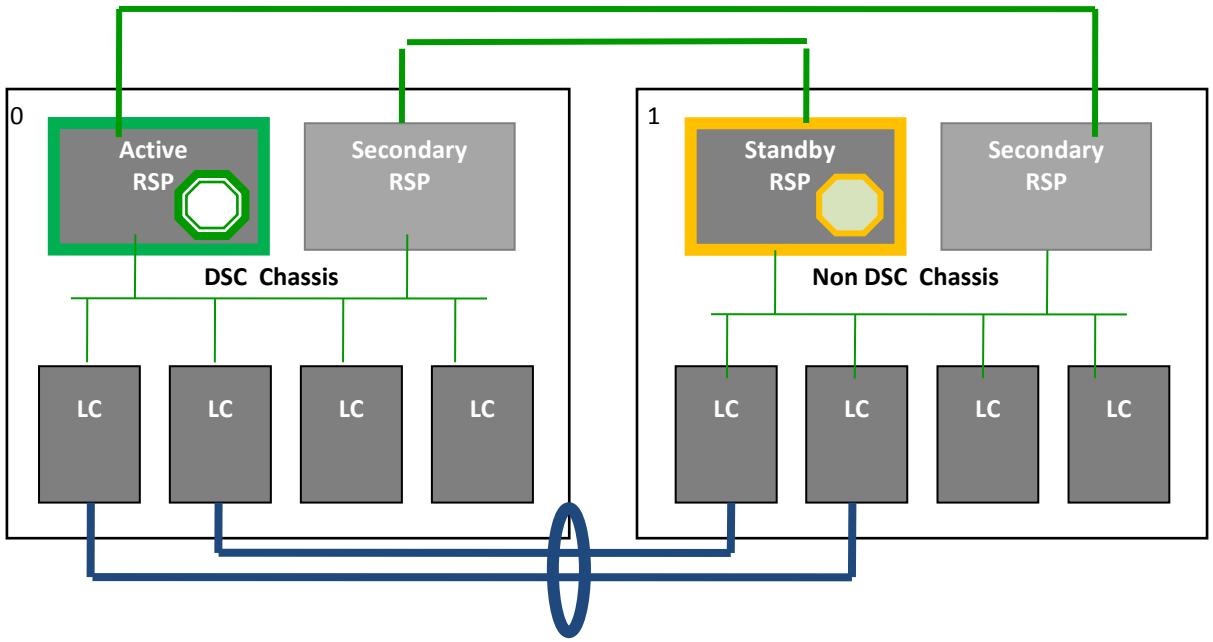
nV cluster技术介绍



- **Only one Active RSP, Only one standby RSP at a given time, which are located on two different chassis**
  - SSO/NSF/NSR works exactly the same way as two RSPs on the same chassis
  - Reliable out of band control channel between two chassis
  - IOS-XR control plan can tolerant hundreds of msec latency*, although the latency can impact overall service convergence time
- **Virtual Chassis is always on as long as there is one chassis and one RSP alive**

* Practically, recommend maximum 10msec latency between two chassis

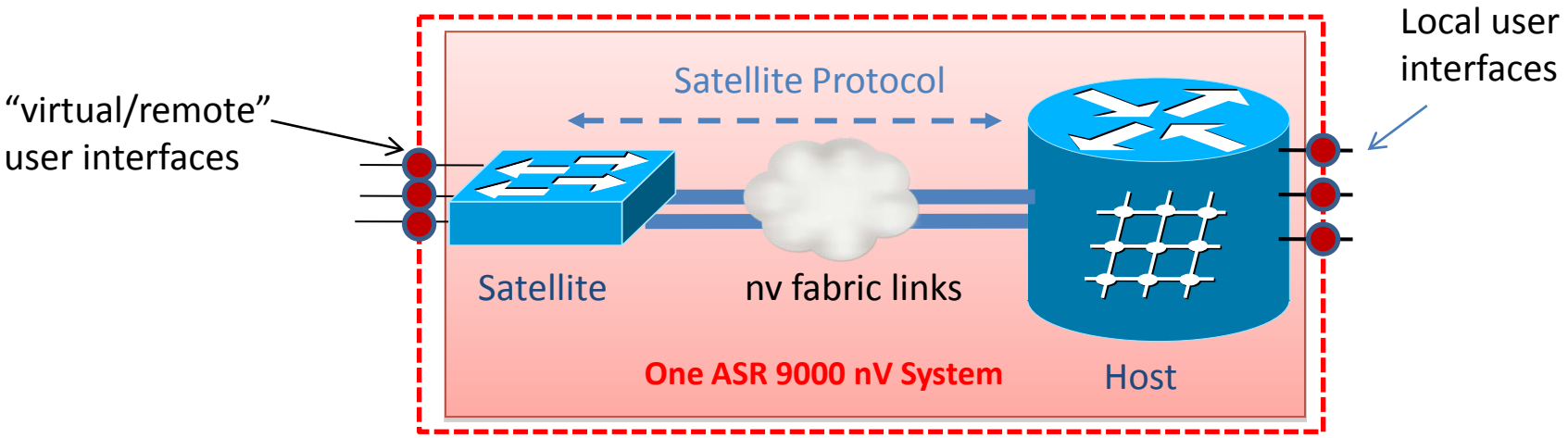
Cluster实现了不丢包网络升级



- **Goal: nV Edge System is always ON, minimize packet loss during image upgrade**
- **Multiple software upgrade options, implemented in multiple phases**
  - **ISSU**
  - **Enhanced ISSU in the future release – upgrade one chassis at a time. In case it require reloading RSP/LC (for example, jump multiple major releases) , it can reload one chassis at a time**

ASR 9000 nV 远端模块技术介绍

免管理的接入网络



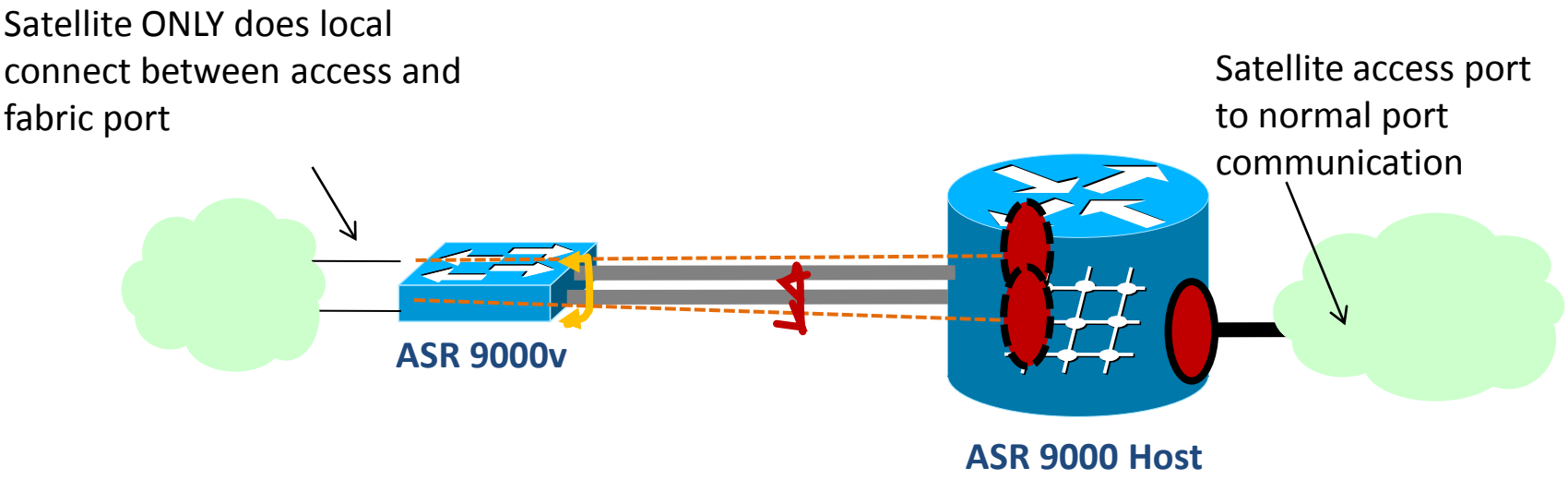
- Install special satellite image on the selected access device to make it ASR9K nv satellite
- Satellite and ASR 9000 Host run satellite protocol for auto-discovery, provisioning and management
- Satellite and Host could co-locate or in different location. There is no distance limit between satellite and Host
- The connection between satellite and host is called "nv fabric link", which could be L1 or over L2 virtual circuit

interfaces on the satellite looks/feels/works the same as the interfaces on the local ASR9K line cards

- From end user point of view, ASR9K Host and associated satellites is one virtual Router system. Satellite is plug-n-play, zero touch configuration/management

Satellite is plug-n-play, zero touch configuration

Satellite技术介绍



- No local switching/routing on satellite, all forwarding is via Host
- Satellite ONLY does local connect between access port and fabric, NOT between access ports. No MAC learning involved
- Advanced features are processed on the Host chassis satellite virtual port
- Minimal mandatory features could be applied to satellite directly, including basic QoS, multicast replication, OAM performance measurement, SyncE. However, the configuration is still done on the Host

ASR 9000v 远端模块介绍

Power Feeds

- Redundant -48vDC Power Feeds
- Single AC power feed

1 RU ANSI & ETSI Compliant

LEDs

Field Replaceable Fan Tray

- Redundant Fans
- ToD/PSS Output
- Bits Out

44x10/100/1000 Mbps Pluggables

- Full Line Rate Packet Processing and Traffic Management
- **Copper and fiber SFP optics**
- **Speed/duplex auto negotiation**

4x10G SFP+

- Initially used as Fabric Ports ONLY (could be used as access port in the future)
- **Copper and fiber SFP+ optics**

Industrial Temp Rated

- -40C to +65C Operational Temperature
- -40C to +70C Storage Temperature

Max Power 210 Watts
Nominal Power 159 Watts

Cisco ASR 901 – Satellite 路由器

Cisco ASR 901 Cell Site Router for 2G, 3G & 4G

Accelerating the migration from 2G/3G to 4G/LTE

Compact

- 1RU, ETSI 300mm depth, < 40W
- Hardened/Extended temp range -40c to +65c

Reliable

- Power Supply: Dual line feed
- Redundant power supply (optional)

Flexible

- LTE ready
- Pay-as-you-grow license model

Scalable

- 12 GE ports + 16 T1/E1 ports
- L2 Switching, L3 Routing capabilities with MPLS, QOS *at line rate*
- SyncE, 1588v2 BC/TC, 10Mhz, BITS, 1PPS, ToD, p2p

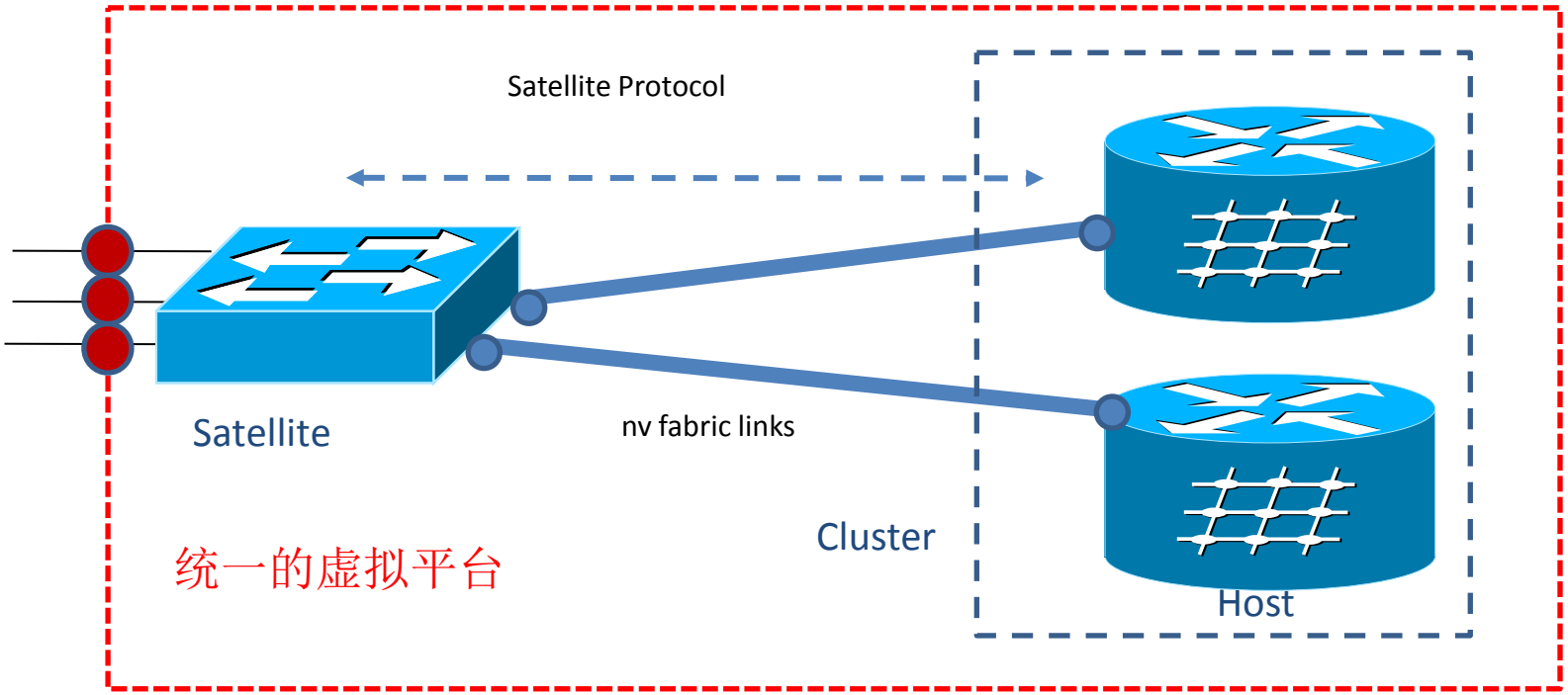
Cisco ASR 903 – Satellite 路由器

Cisco ASR 903 Unified Ethernet Access

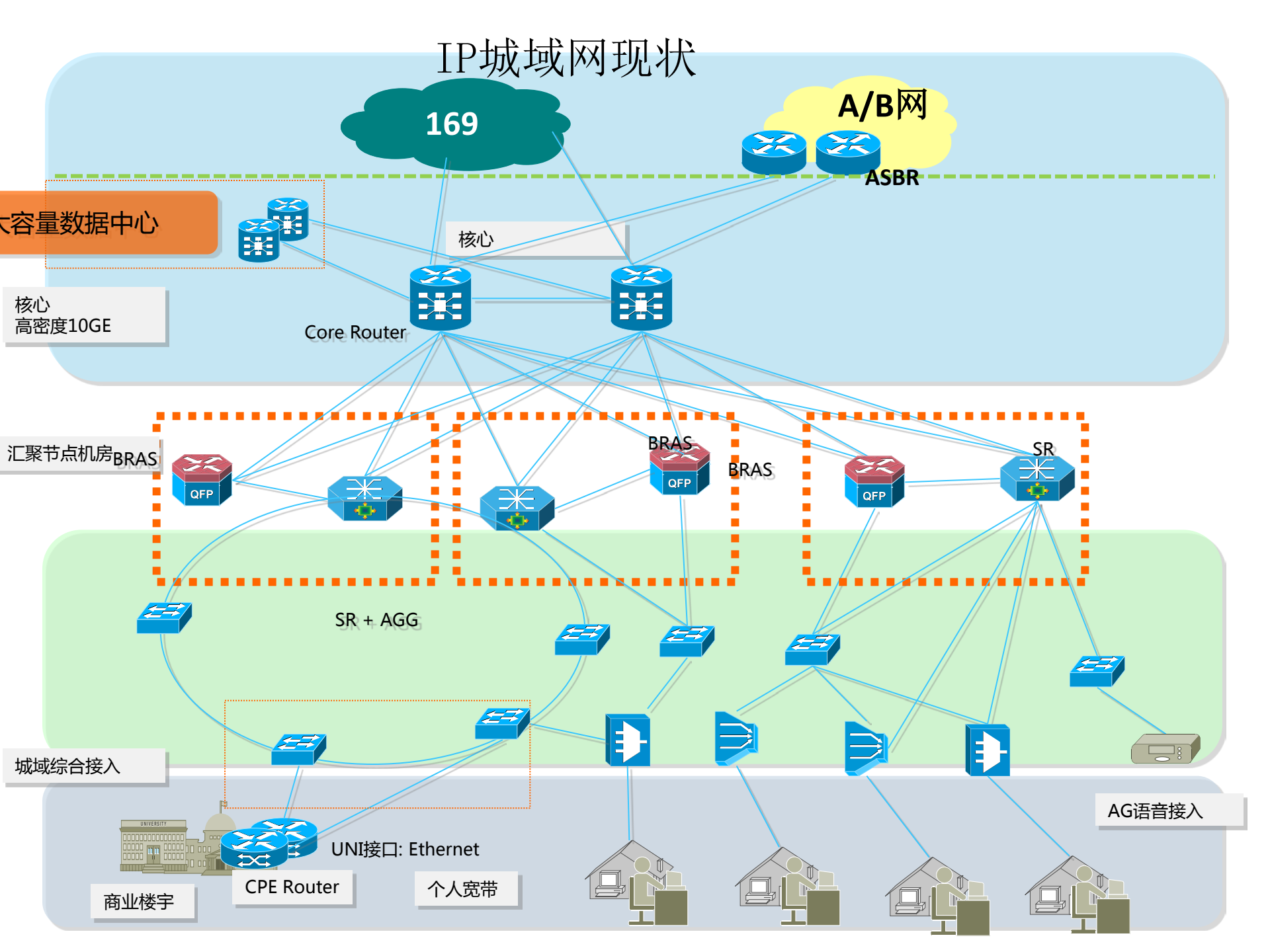
Breaking the silos of Residential, Business & Mobile

- Compact
  - 3RU, 6 Interface Slots
  - Fits in 300mm cabinets (9.2” deep)
- Reliable
  - Redundant PSUs, FANs and RSPs
  - Extended operating temp. range -40 to 65 C
- Scalable
  - Ethernet : 1x10GE and 8xGE
  - TDM/ATM: 16x T1/E1 and 4x STM1 / 1x STM4
  - nV enabled

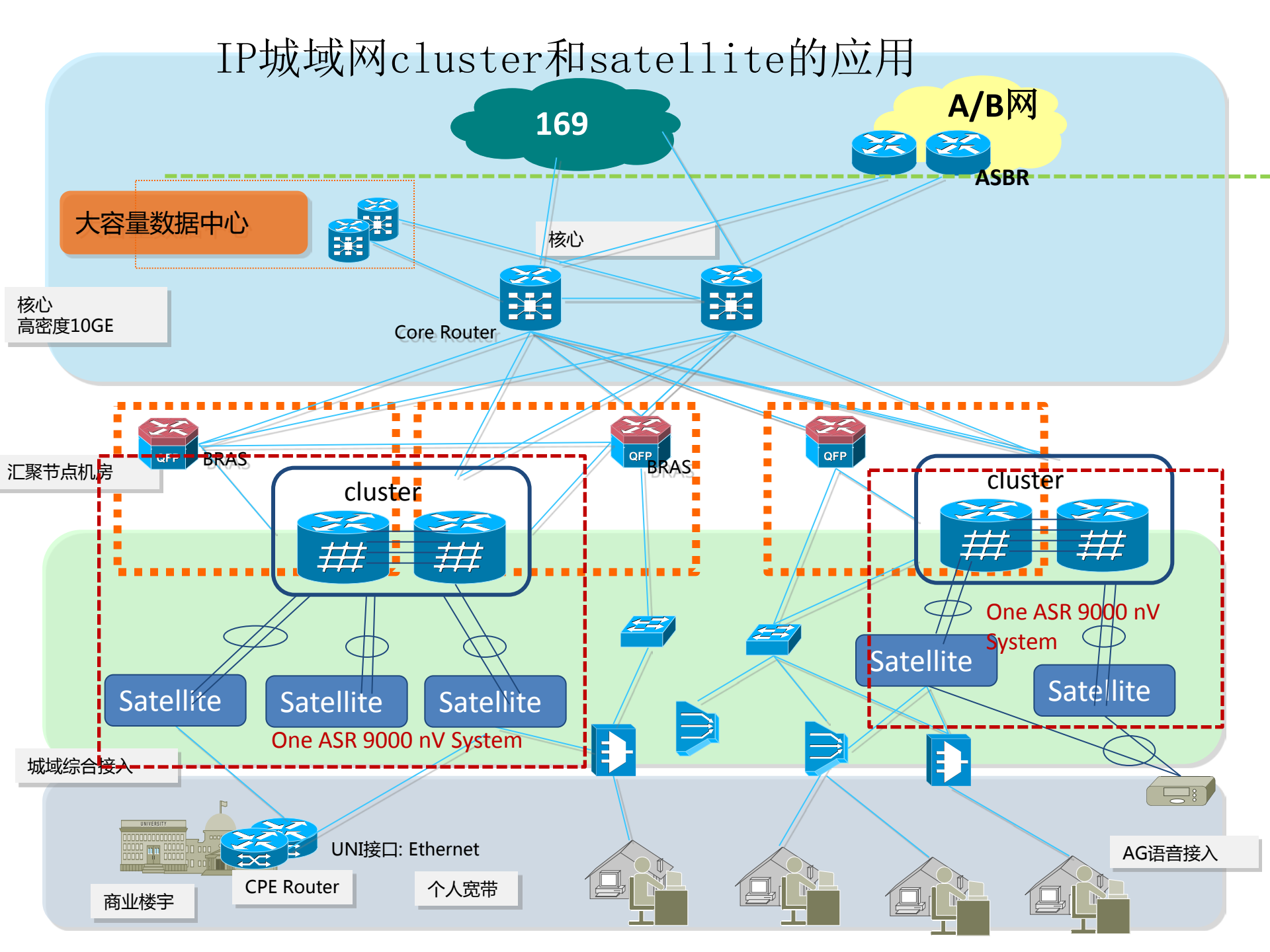
nV Cluster与Satellite 技术结合构建简化可靠的汇聚接入网络



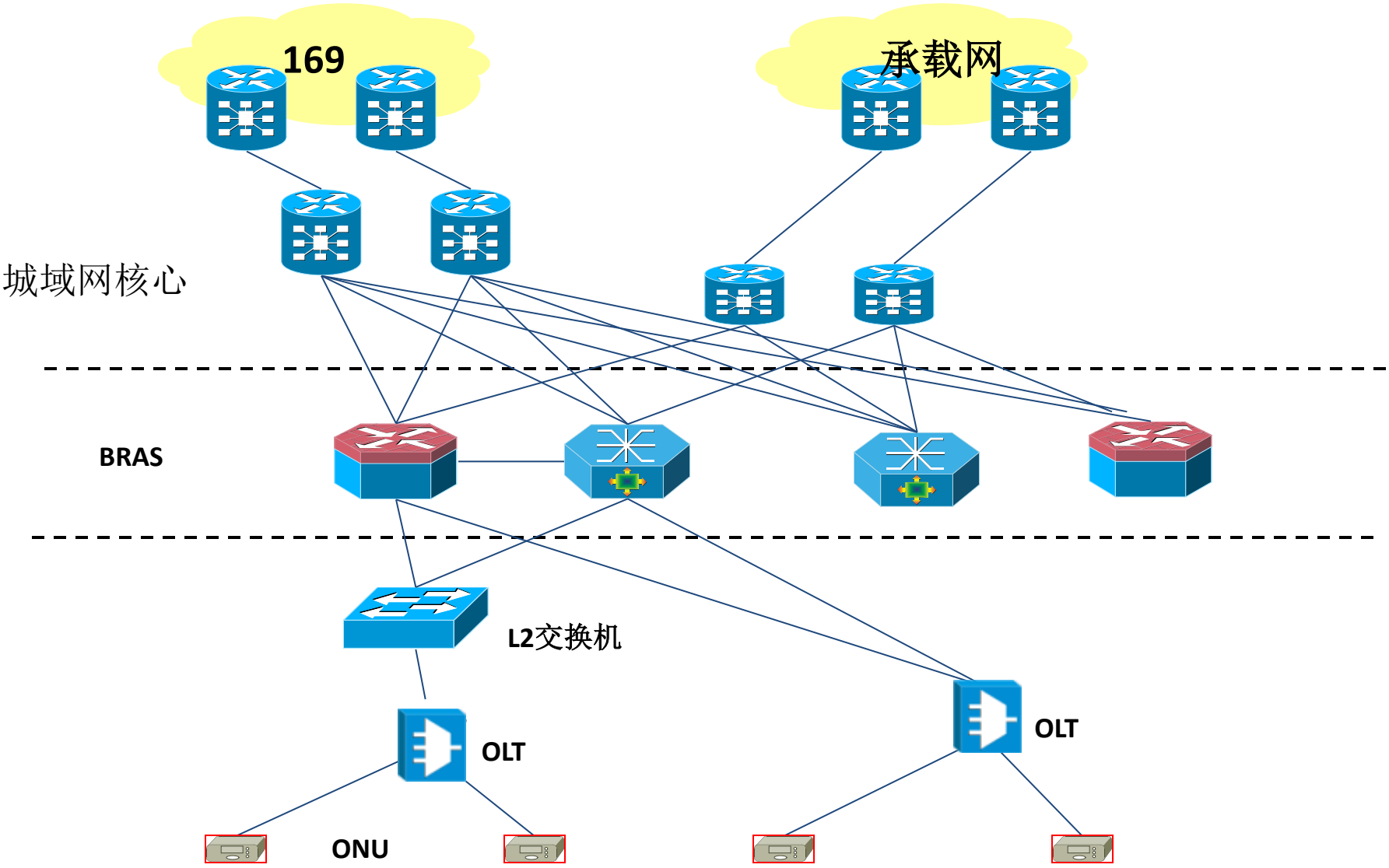
IP城域网现状


169
A/B网
ASBR
大容量数据中心
核心
核心
高密度10GE
Core Router
汇聚节点机房
BRAS
QFP
BRAS
BRAS
SR
QFP
QFP
SR + AGG
城域综合接入
AG语音接入
UNI接口: Ethernet
CPE Router
商业楼宇
个人宽带

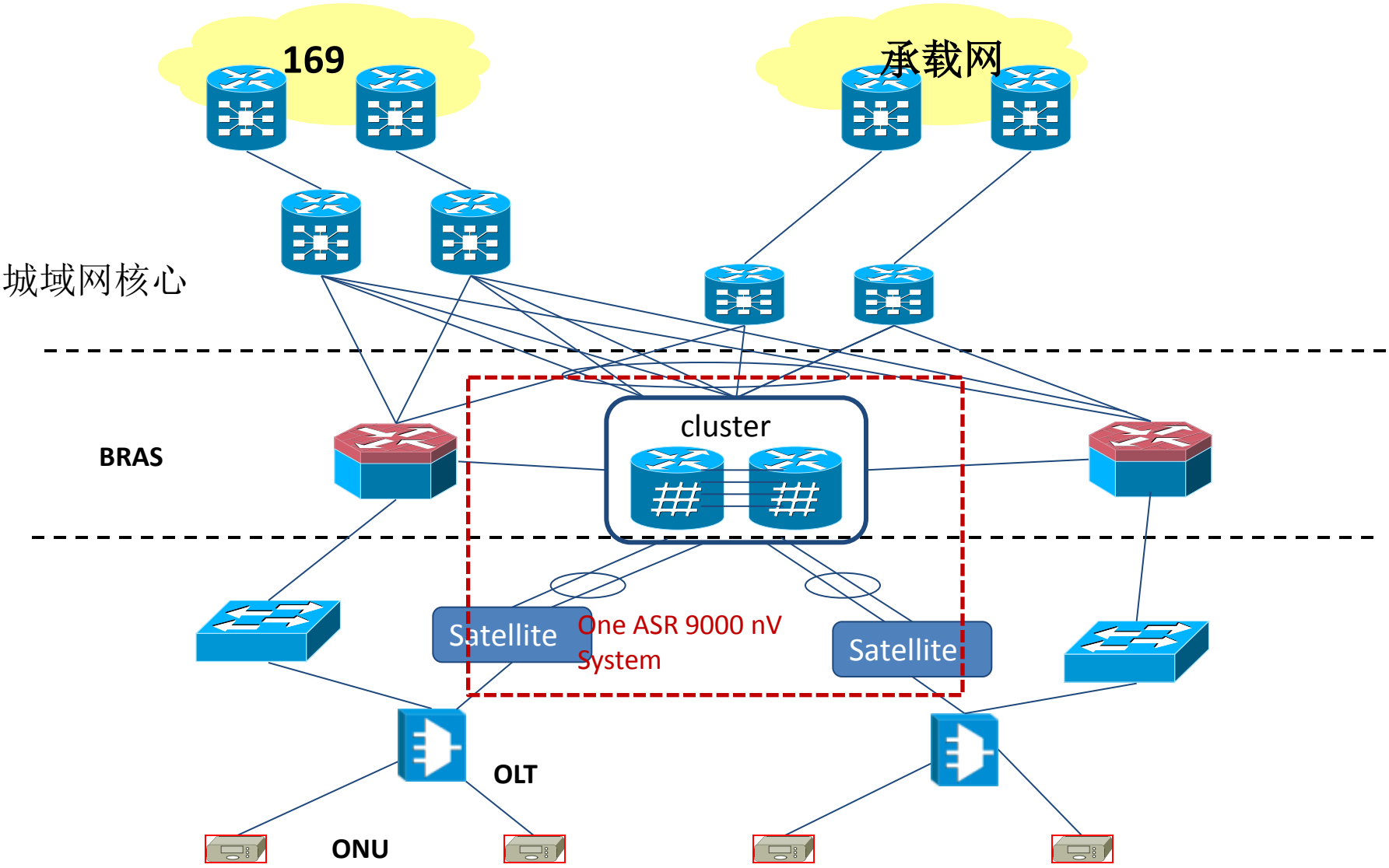
IP城域网cluster和satellite的应用



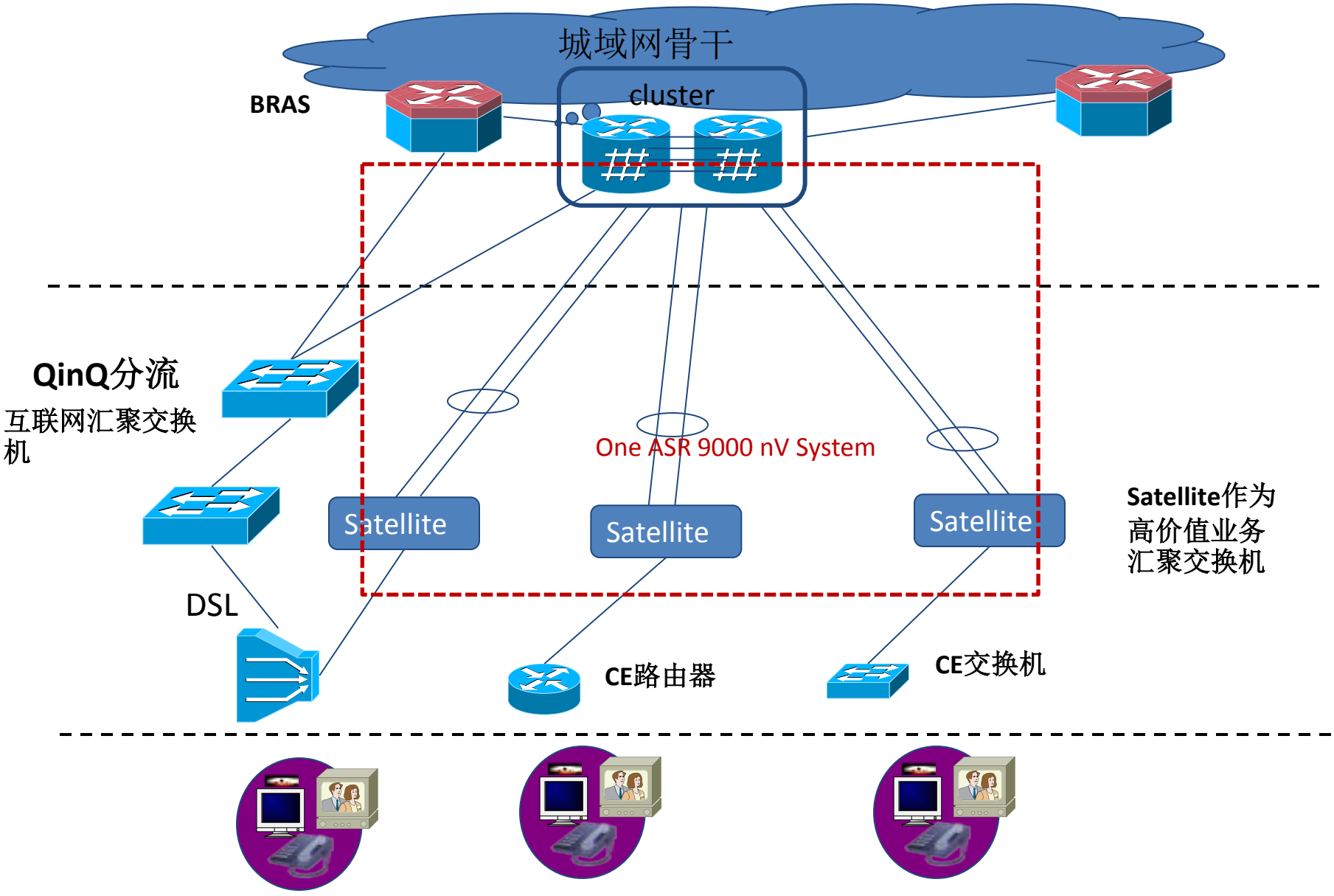
EPON组网



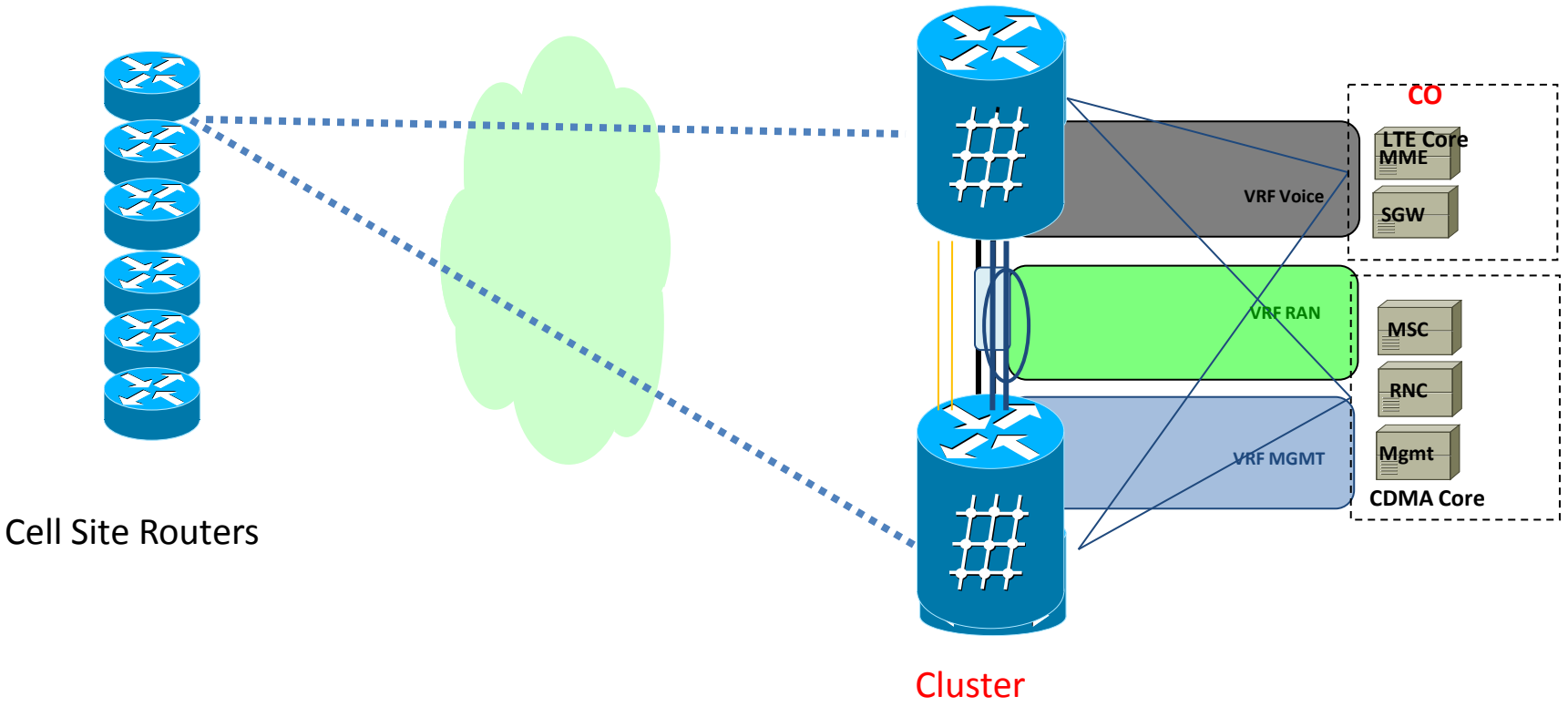
EPON组网-扁平化、冗余备份



大客户VIP组网


城域网骨干
cluster
BRAS
QinQ分流
互联网汇聚交换机
One ASR 9000 nV System
Satellite
Satellite
Satellite
Satellite作为高价值业务汇聚交换机
DSL
CE路由器
CE交换机

移动IP-RAN组网


CO
LTE Core
MME
SGW
VRF Voice
VRF RAN
MSC
RNC
VRF MGMT
Mgmt
CDMA Core
Cell Site Routers
Cluster

ACG Whitepaper

A Business Case for Scaling the Next Generation Internet with the Cisco ASR 9000 System

Available for download:

http://blogs.cisco.com

&

http://www.acgresearch.net

And search for

"ACG Business Case for Next-Generation Internet"

ACG RESEARCH

A Business Case for Scaling the Next-Generation Network with the Cisco ASR 9000 System

Executive Summary

The demand for triple-play and quad-play services is putting pressure on vendors to deliver highly scalable network solutions. Video services are driving explosive growth in bandwidth, particularly in access and aggregation networks. Consequently, broadband operators' business models are threatened because pricing policies do not reflect the increasing bandwidth growth. To address this challenge, broadband operators require routing solutions that cost efficiently scale with the growth in traffic. Cisco addresses this challenge with the Cisco ASR 9000 System and its network virtualization (nV) technology.

ACG Research has developed a business case analysis for the Cisco ASR 9000 System when deployed across a triple and quad-play access and aggregation network. The business case analysis compares the cash flow and six-year cumulative total cost of ownership (TCO) of the Cisco ASR 9000 System with the routing solutions of two leading vendors (Vendor A and Vendor B) where the necessary routing and advanced features needed for triple-play and quad-play service delivery are embedded in the hardware of each routing chassis. The analysis shows that the Cisco ASR 9000 System drives down the cost of bandwidth as compared to the competing solutions.

Key Takeaways

- The Cisco ASR 9000 System achieves dramatically reduced TCO through its network virtualization (nV) technology that delivers GE aggregation and access ports with rich levels of functionality provided by an ASR 9000 System.
- CapEx is reduced because the ASR 9000 System has high port densities and more card slots per chassis, and due to its distributed router functionality.
- The ASR 9000 System's network virtualization design simplifies network operations and reduces operations expense (OpEx).
- The ASR 9000 System reduces network OpEx by up to 71%. The savings are attributed to simpler network operations across the lifecycle and up to a 65% reduction in power consumption, which reduces power, cooling, and floor space expenses.
- TCO is reduced by up to 73% over competitive solutions that lack nV technology.
- The payback on the investment in a complete ASR 9000 System is less than one year, assuming that only 2% of service revenues are allocated to paying back this investment.

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- CapEx is reduced due to high port densities and more card slots per chassis
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Thank you.