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CN2 Network Management Practice
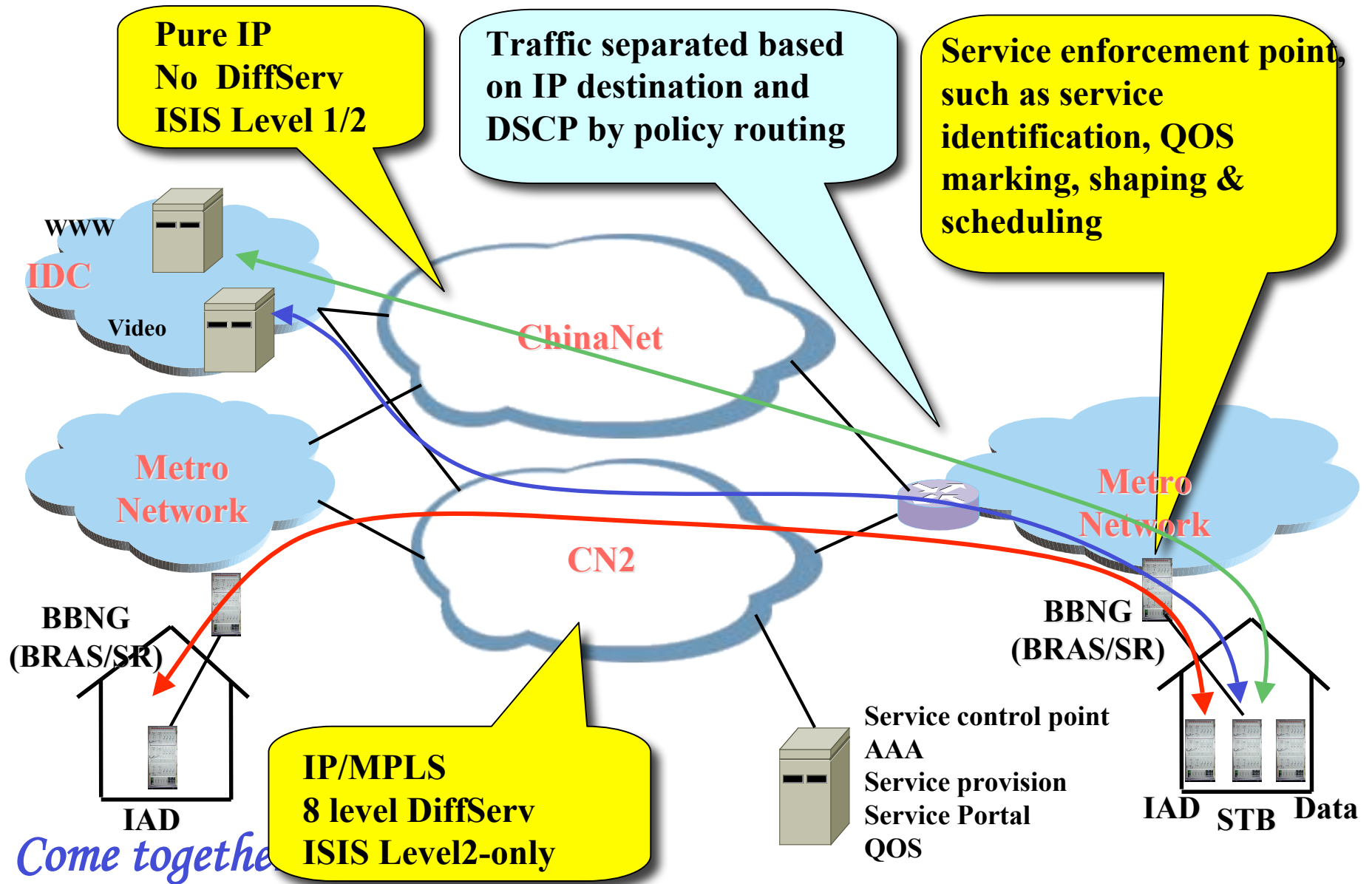
China Telecom Guangzhou Institute

dingsy@gsta.com

Contents

➤Introduction about the network

➤Practice of CN2 Network Management

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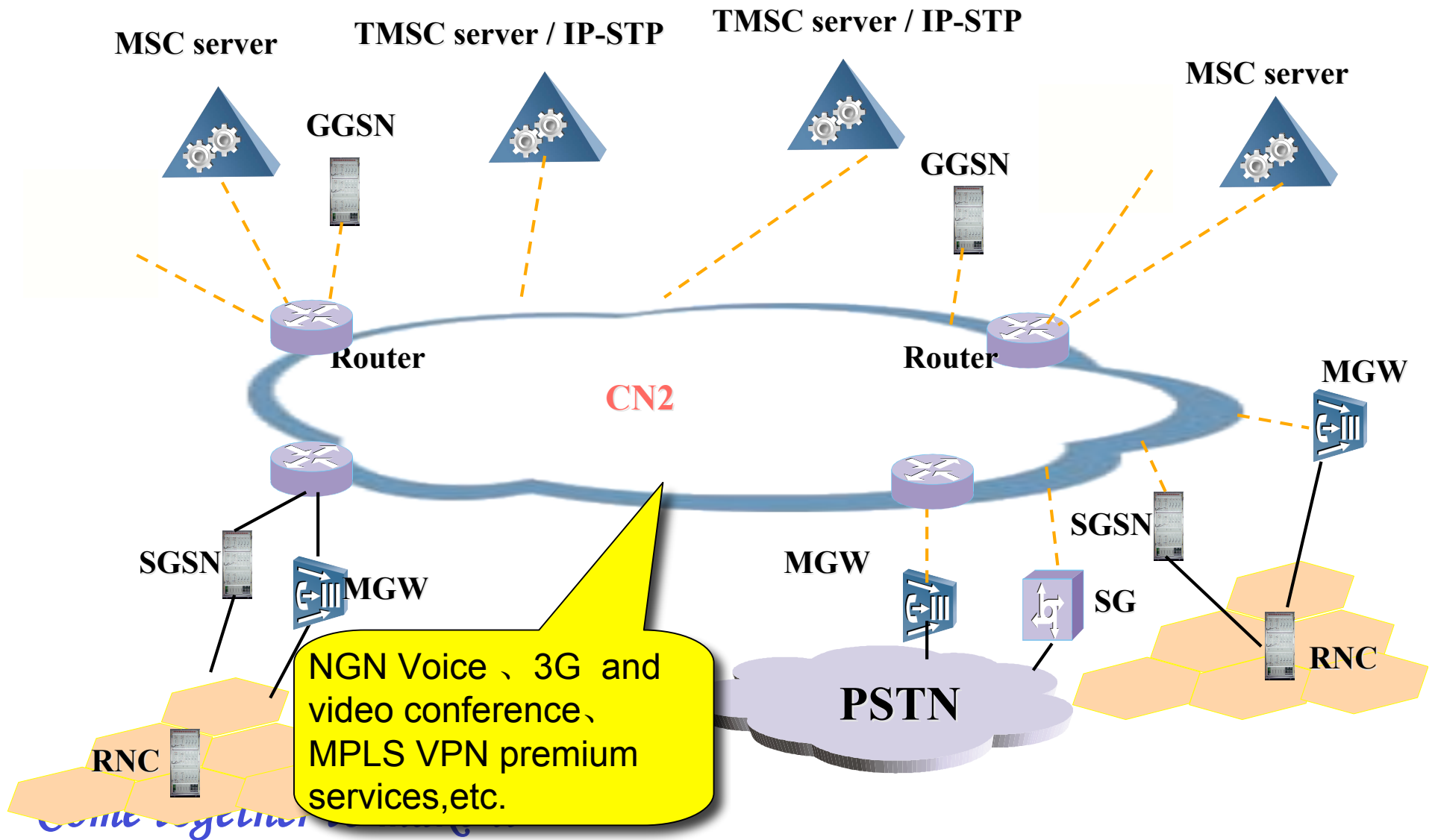
CT IP Network Overview

- ➢ Regional Network
  - ❖ ChinaNet and CN2 share Metro and access networks
  - ❖ Over 200 metro networks, it is affected by traditional regionalism (`administrative regions`), although CT tries to converge it

- ➢ Broadband users(4/2005)
  - ❖ About 12 million ADSL
  - ❖ And 4.7 million LAN subscribers

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CN2 Overview

MSC server

TMSC server / IP-STP

TMSC server / IP-STP

MSC server

GGSN

GGSN

Router

Router

MGW

CN2

SGSN

MGW

SGSN

MGW

SG

RNC

NGN Voice 、3G and video conference、MPLS VPN premium services,etc.

PSTN

RNC

CN2 Overview

> CN2 overview

- ❖ Two function planes and 4 architecture layers
  - ✛ High speed forwarding plane and service providing plane
  - ✛ Core layer, aggregation layer, edge layer and service layer
- ❖ 627 routers cover 200 cities
  - ✛ 402 core routers and 201 SR(PE)
  - ✛ 12 global RR ,12 VPN RR
  - ✛ Alcatel、Cisco、Juniper、Huawei routers were deployed
- ❖ Capacity
  - ✛ Bidir 152T router switch capacity on forwarding plane
  - ✛ Bidir 64T router switch capacity on service plane
  - ✛ Over 1800 10G/2.5G/GE link,3.4T relay link bandwidth and 2.9T access bandwidth

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Contents

➢Introduction about the network

➢Practice of CN2 Network Management

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➢ Deliver high quality services to customers

➢ Real-time network status monitor and online trouble-shooting

➢ Centralized and accurate inventory management

➢ Systematic data for network optimization and simulation

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➢ Common issues

❖ No standards define what functions IPNMS must have

❖ Network management protocol is far away from powerful.The widely used SNMP is not fit for configuration management

❖ Much information only can be collected through telnet interface which is very hard to use.

❖ IP technology develops very fast and is becoming more complex

❖ Few software companies are qualified to develop professional management tools

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Challenges:Particular difficulties for CN2

➢ For CN2

  ❖ We want to manage the network centrally and implement end-to-end fulfillment and assurance

➢ However

  ❖ The conventional management mode in China Telecom is strongly affected by regionalism

  ❖ For example,the existed ChinaNet(AS4134) is controlled by different provincial companies though it's an integral network

➢ So

  ❖ we need to reorganize the operating team and break the traditional management style

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Solution Overview:Principles

- ➢ Centralization
  - ❖ System centralization
    - ⊕ Centralized deployment to reduce maintaining cost
  - ❖ Management centralization
    - ⊕ Centralized design
    - ⊕ Centralized monitor
    - ⊕ Centralized trouble shooting
- ➢ Loose-coupling
  - ❖ The system should be implemented in a way that the update and deployment can be modularized
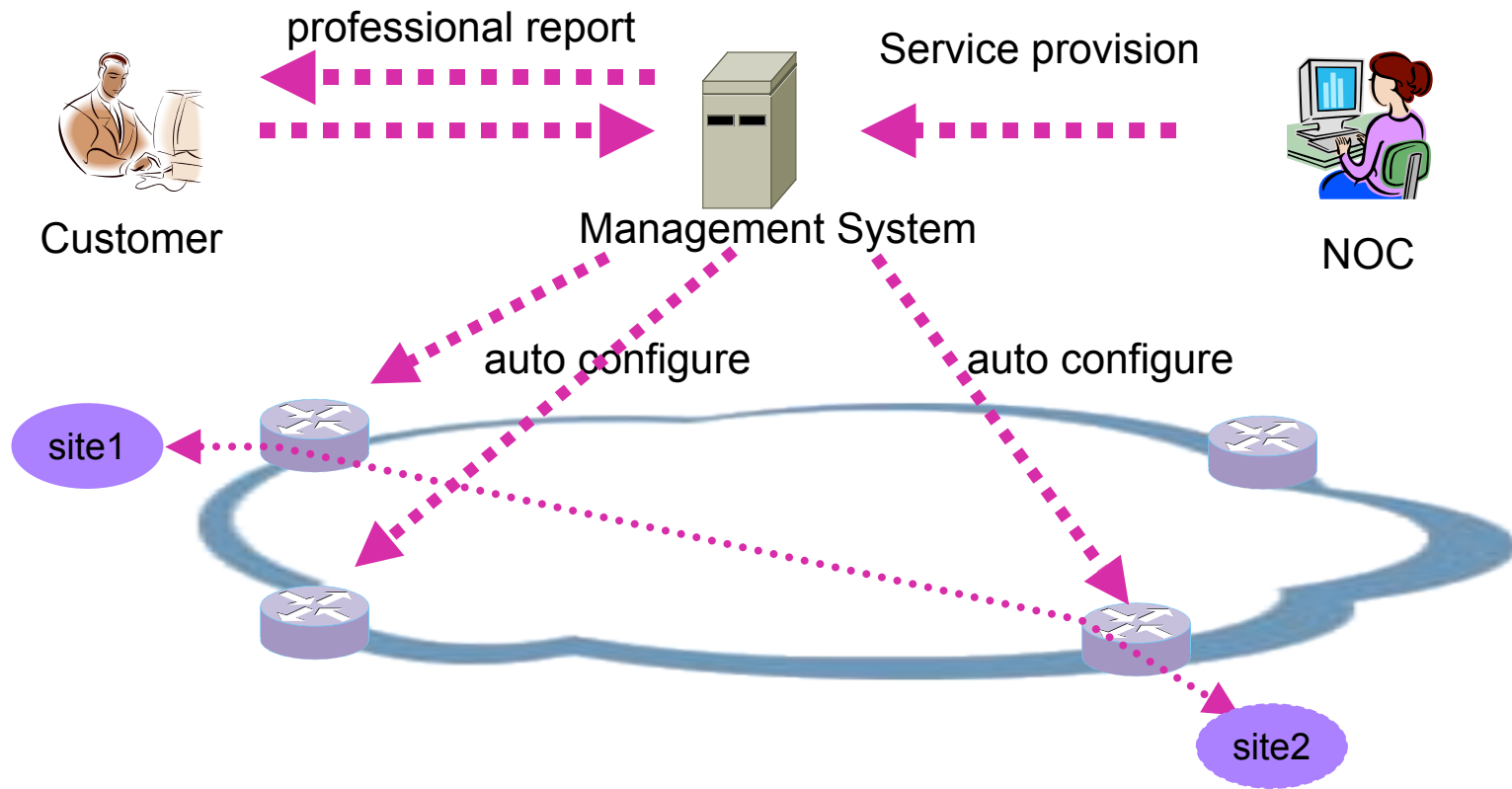- ➢ High availability and flexibility

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➤ System decomposition

  ❖ Service management subsystem

  ❖ Network management subsystem

  ❖ Process management subsystem

➤ Service management subsystem

  ❖ Focus on VPN provisioning and assurance

  ❖ Managed scope:All service routers(more than 200)

➤ Network management subsystem

  ❖ Focus on network monitor and analysis

  ❖ Managed scope:All P routers(more than 600)

➤ Process management subsystem

  ❖ Ticket tracking system for service and trouble to improve operation efficiency

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Service Management Subsystem:Vision

professional report

Service provision

Customer

Management System

NOC

auto configure

auto configure

site1

site2

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➢ Key requirements

❖ Cover more than 200 PEs

❖ Customer-oriented design and operation

❖ Automatic and end-to-end service provisioning

❖ Basic network data and report for each customer

❖ Inside VPN report provided as value-added service for customer

➢ Solution

❖ Basic module:Cisco ISC

❖ GUIs are redeveloped to make the operation more friendly and customer-oriented

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➢ Results it produced

❖ Service provisioning can be fulfilled through the system including resource planning and allocation

❖ Network failure can be linked to affected customers automatically

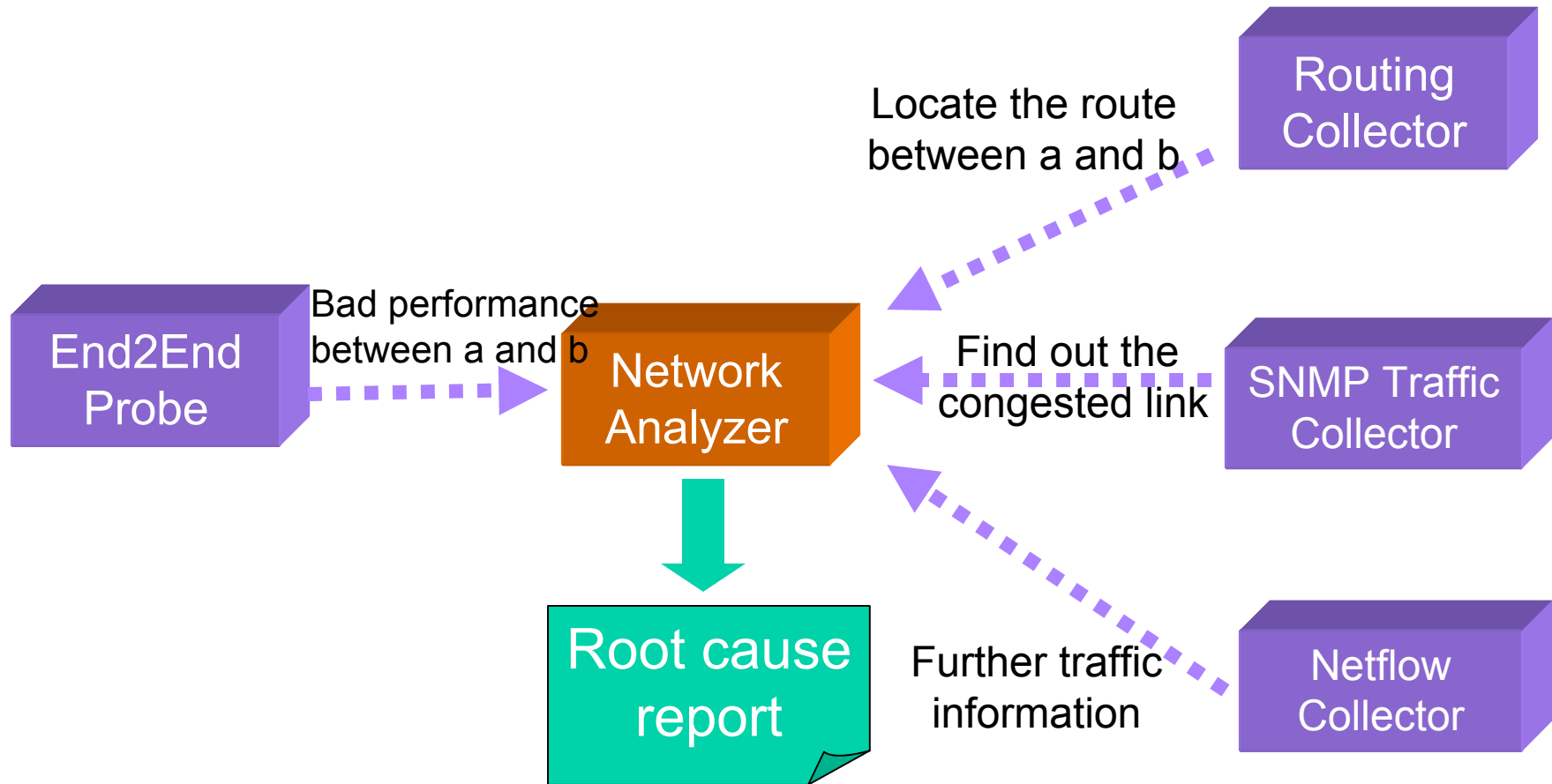❖ Basic network data and report can be provided for each customer

➢ Remaining issues:

❖ Can not support complex QoS policies well

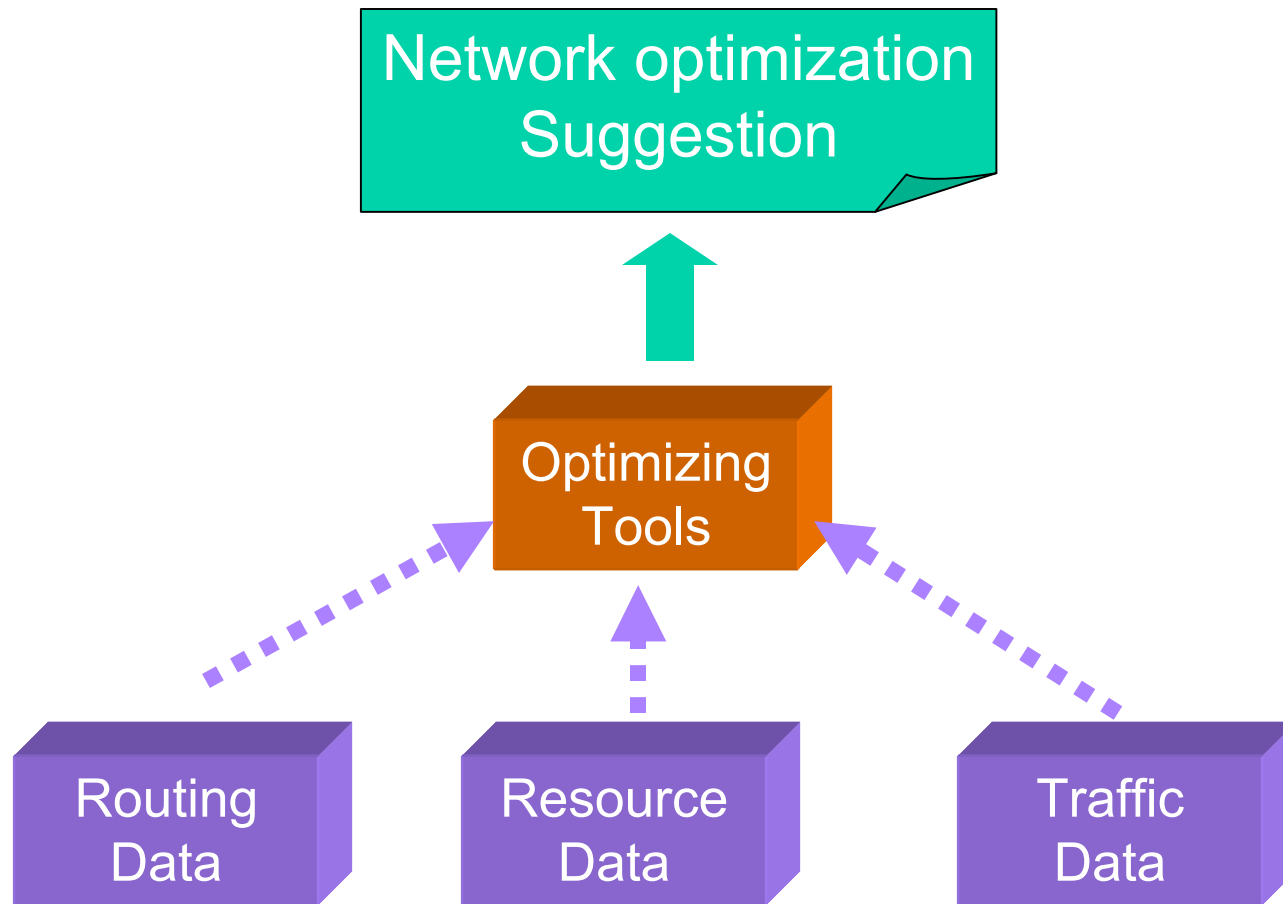❖ Can not provide inside-VPN traffic analysis

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Routing Collector

Locate the route between a and b

End2End Probe

Bad performance between a and b

Network Analyzer

Find out the congested link

SNMP Traffic Collector

Root cause report

Further traffic information

Netflow Collector

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Network optimization Suggestion

Optimizing Tools

Routing Data

Resource Data

Traffic Data

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Network Management

➤ Key requirements

  ❖ Manage more than 600 routers

  ❖ Capture network failure in less than one minute

  ❖ Intelligent end to end trouble shooting

  ❖ Accurate resource management

  ❖ Complete traffic matrix report

➤ Solution

  ❖ Traffic module:Arbor PeakFlow

  ❖ Routing module:Packet Design Route Explorer

  ❖ Resource module:ZhongYing IETView

  ❖ Performance module:ZhongYing IETVIew

  ❖ Trouble module:ZhongYing IETView

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➢ Results

❖ All basic network alarms are collected and effectively processed

❖ Link state changes can be reported in less than 1 minute thanks to Routing Explorer

❖ Network topology and resource can be viewed conveniently

❖ The whole network traffics are under surveillance using flow sampling technologies

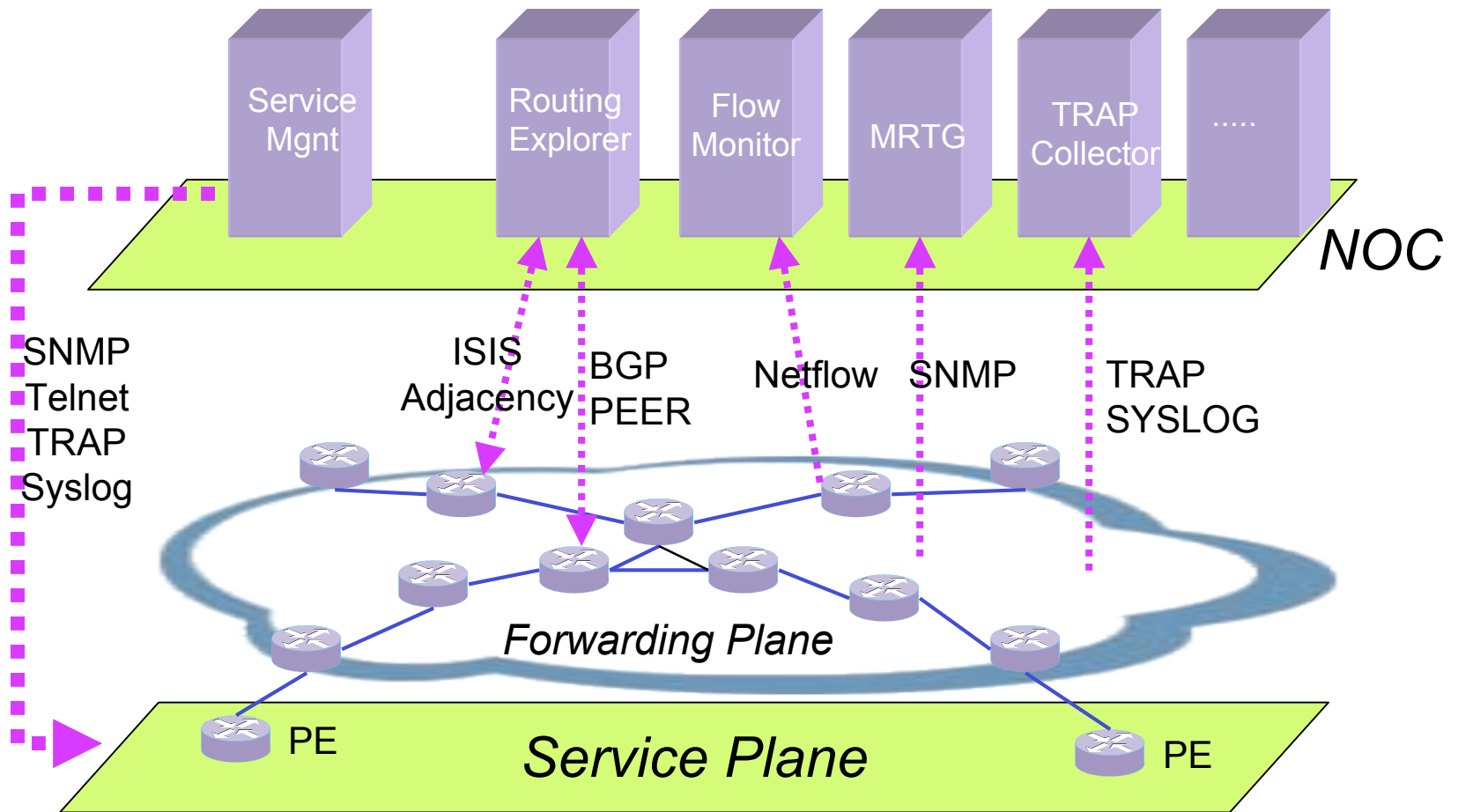❖ Abundant datas available for network performance evaluation

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➢ Remaining issues

- ❖ Datas from different modules still cannot be organized well for trouble shooting and analyzing
- ❖ Too difficult to consolidate all the disparate subsystems at present
- ❖ Full mesh end to end test hasn't been deployed due to router's and system capacity limitation
- ❖ Cann't support QoS configuration and analysis well
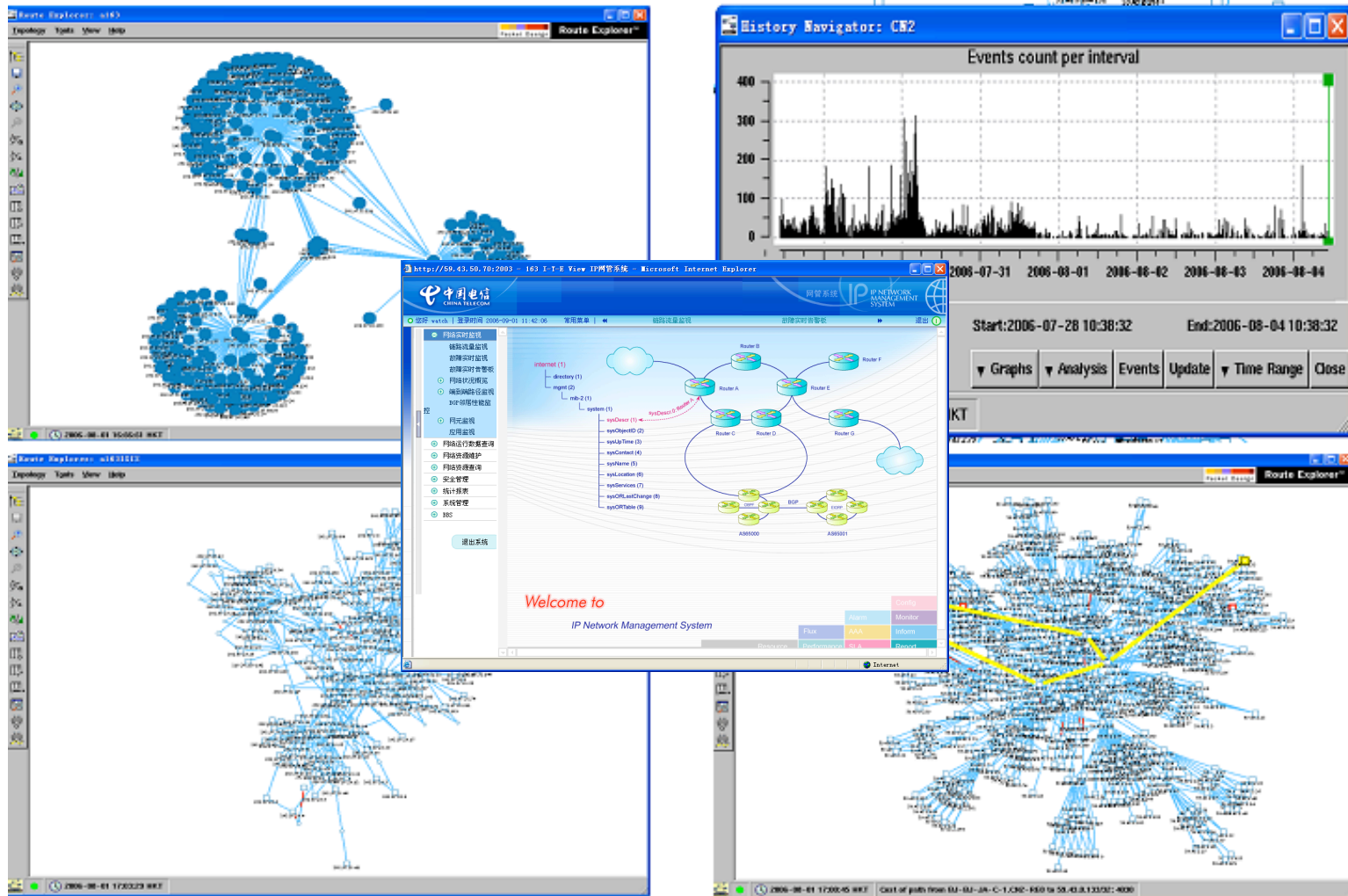
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Deployment Overview

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NOC

- Service Mgnt
- Routing Explorer
- Flow Monitor
- MRTG
- TRAP Collector
- .....

SNMP
Telnet
TRAP
Syslog

ISIS Adjacency

BGP PEER

Netflow   SNMP

TRAP SYSLOG

Forwarding Plane

Service Plane

PE

PE

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Deployment Overview

- ## Service management
  - A dedicated server managing all PE routers
- ## Route Explorer
  - Collect ISIS and BGP protocol data by establishing ISIS adjacency and BGP peer with two routers in the network
- ## Traffic Monitor(Flow&MRTG)
  - Collect all interfaces' traffic information by SNMP from all P routers
  - Enable netflow on all the interfaces connecting the core layer
  - 1 dedicated SNMP polling server and 6 Peakflow boxes
- ## TRAP Monitor
  - 1 dedicated server collecting all the traps and syslogs
- ## Database server
  - 1dedicated server
- ## Storage devices

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Some snapshots

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- Management system construction is more difficult and challenging than network construction in some sense
- Common software companies are not so qualified to understand telecom 's requirement and technologies
- Third-party software providers must be able to provide convenient and public APIs for further integration
- We should not expect NMS be perfect,instead,we need to pay more patience

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- ➢ Strengthen management functions for customer's VPN network
- ➢ Multicast service provisioning and assurance
- ➢ Introduce auto MPLS troubleshooting
- ➢ Enable network management modules QoS supported
- ➢ Deploy dedicated end-to-end testing boxes widely
- ➢ P2P analysis and management

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Thank you!

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