An Integrated Network Management System for SDH Broadcasting Networks

Geneva, June 19th, 2007

EBU NMC Seminar "Network 2007-To IP and beyond
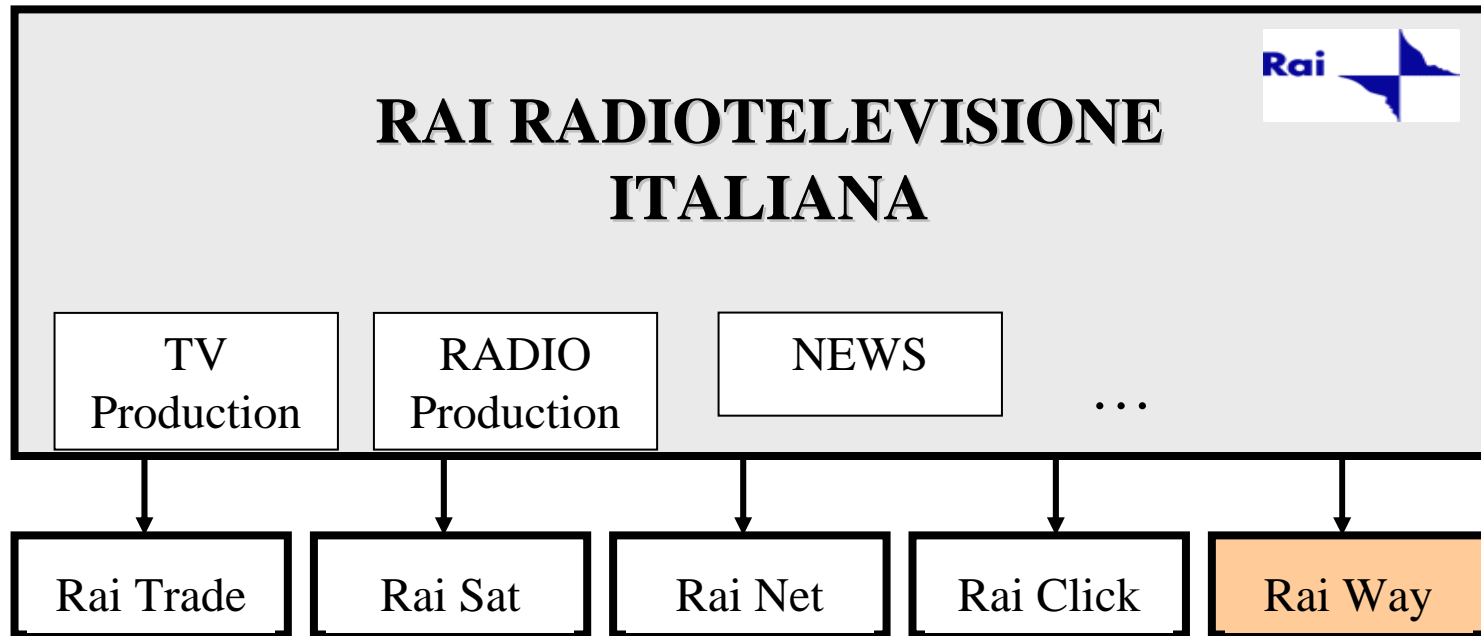
Speaker: Raffaele Ferrari

Rai – Radiotelevisione Italiana
Company profile

RAI RADIOTELEVISIONE ITALIANA

TV Production	RADIO Production	NEWS	…

Rai Trade	Rai Sat	Rai Net	Rai Click	Rai Way

Rai Way is one of the associate companies of the group in charge of managing the network infrastructure in order to provide the entire national territory with broadcasting services.

Rai – Radiotelevisione Italiana
Rai Way network and services

♦ **Rai Way Network**

  ➢ RAI Way, through its network Waynet, reaches 99 percent of Italy and connects the 21 major Italian cities where television and radio programs are produced.

  ➢ The company manages 2,300 locations throughout Italy. RAI Way also has more than 60 other access points to its transmission network for connecting broadcasting units outside the country.
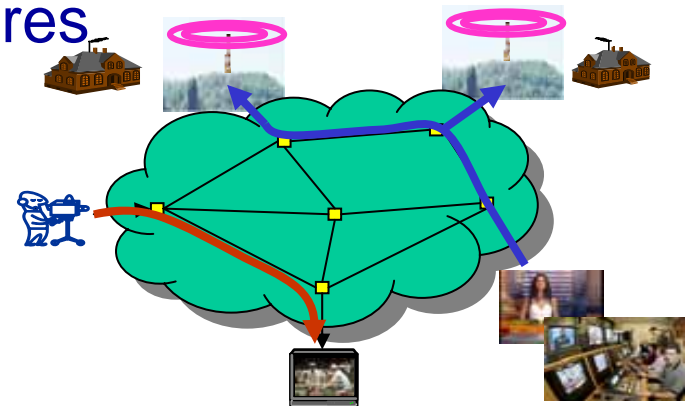
♦ **The main broadcasting services which can be provided are as follows** :

  ➢ analog terrestrial TV, digital terrestrial TV (DVB-T), analog radio, in Frequency Modulation (FM), in Medium Wave (MW) and Short Wave (SW), at international, national, regional and local levels;

  ➢ terrestrial digital radio (DAB-T);

  ➢ satellite analog and digital TV (DVB-S) via Hot Bird 1 and 2;

  ➢ Isoradio FM service in isofrequency (103.3 MHz) for drivers
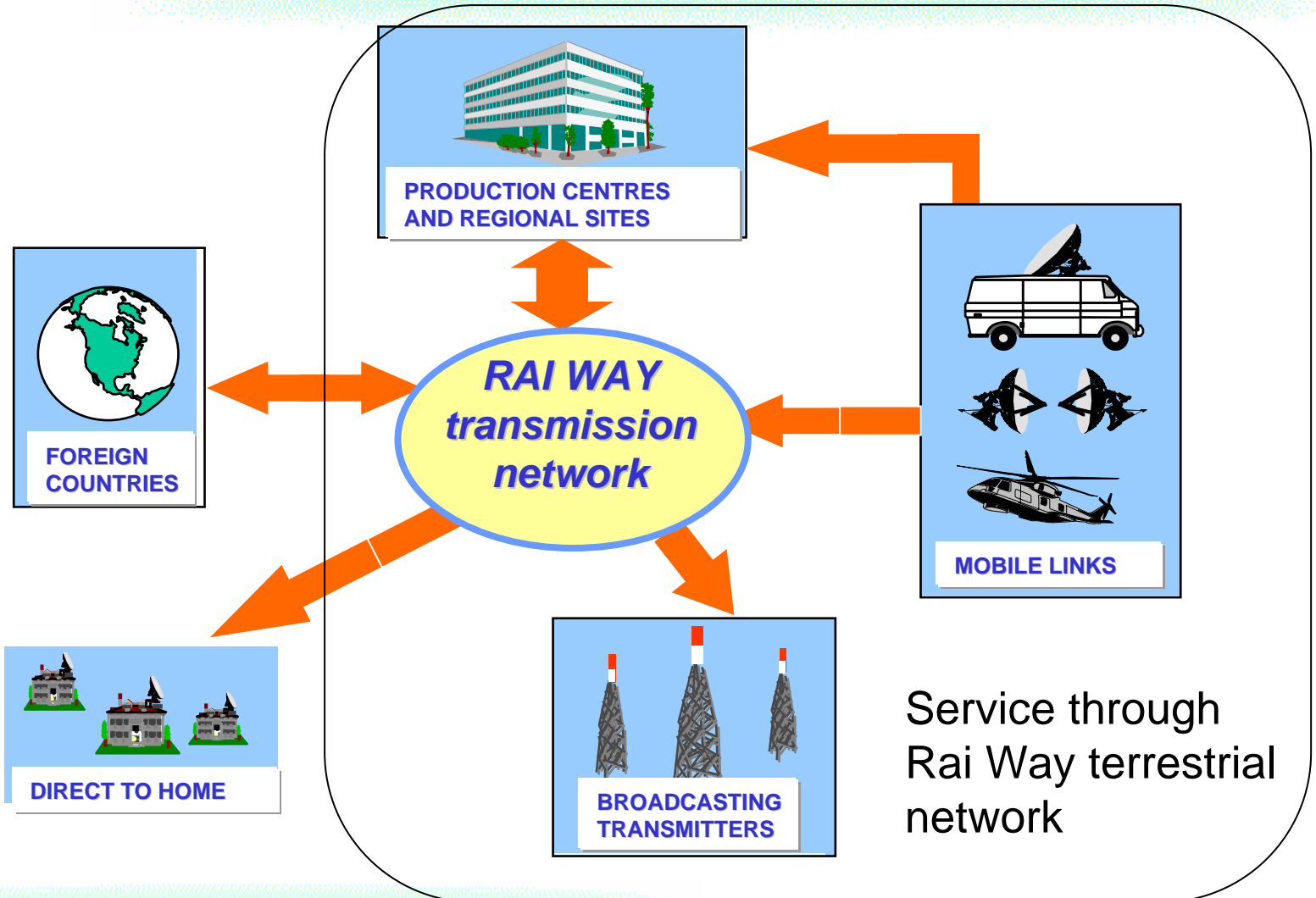
Transport requirements of broadcasters
TV contribution and distribution networks

Rai Way

♦ ***Contribution:*** transport of high-quality video/audio streams (mainly real-time) between different sites (Regional Sites, Production Centres, etc.)

 ➢ Point-to-point or point-to-multipoint
 ➢ Frequent network re-configurations
 ➢ Variable source and destination points
 ➢ High video quality and network reliability
 ➢ Low latency

♦ ***Primary distribution:*** transport of TV and radio programs to all the primary Broadcasting Centres

 ➢ National or regional coverage
 ➢ One source / many destinations
 ➢ Non-stop transmission
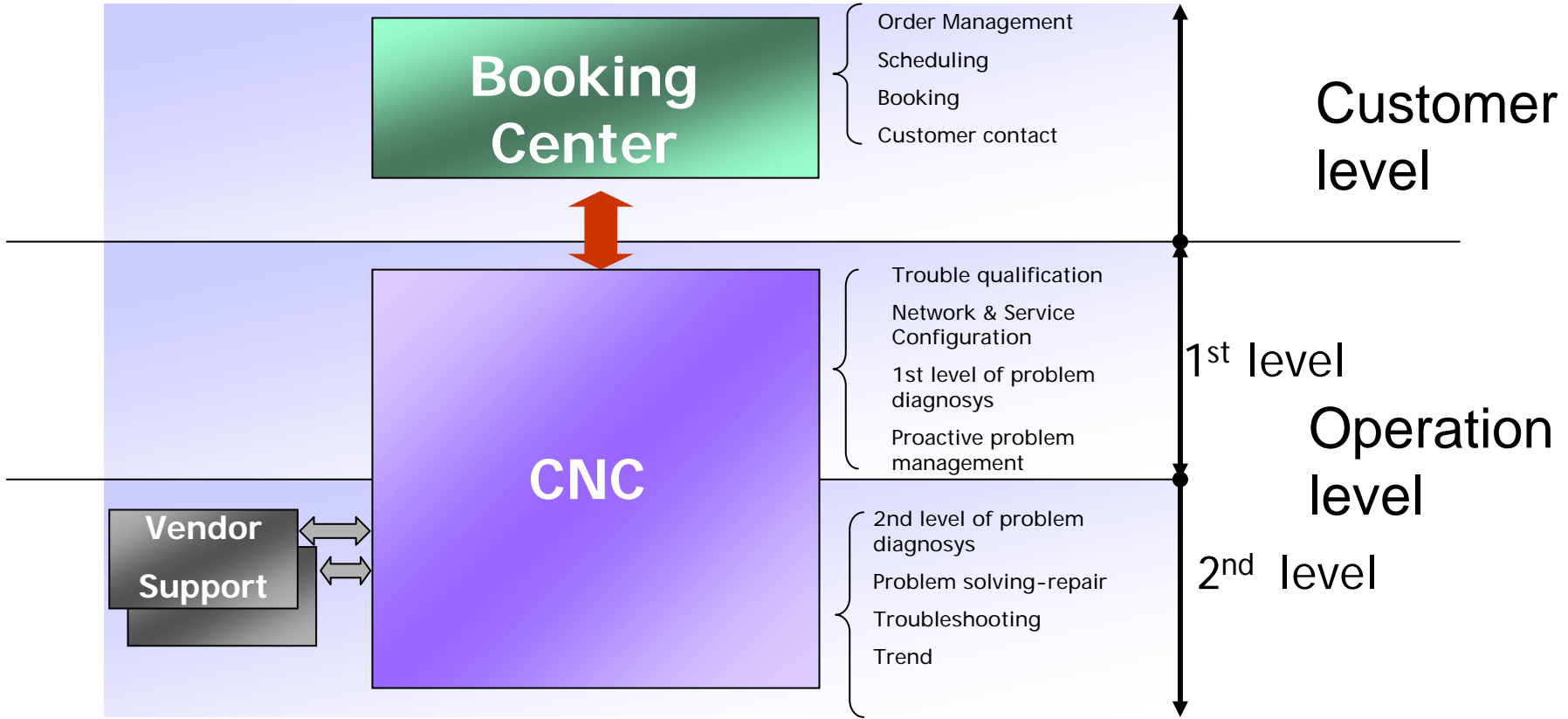 ➢ Fixed network configuration

Rai Way transmission networks logical functions

PRODUCTION CENTRES AND REGIONAL SITES

RAI WAY transmission network

FOREIGN COUNTRIES

MOBILE LINKS

DIRECT TO HOME

BROADCASTING TRANSMITTERS

Service through Rai Way terrestrial network

Rai contribution and distribution network
The operational context

Booking Center
- Order Management
- Scheduling
- Booking
- Customer contact

Customer level

CNC
- Trouble qualification
- Network & Service Configuration
- 1st level of problem diagnosys
- Proactive problem management

1st level

Operation level

- 2nd level of problem diagnosys
- Problem solving-repair
- Troubleshooting
- Trend

2nd level

Vendor Support

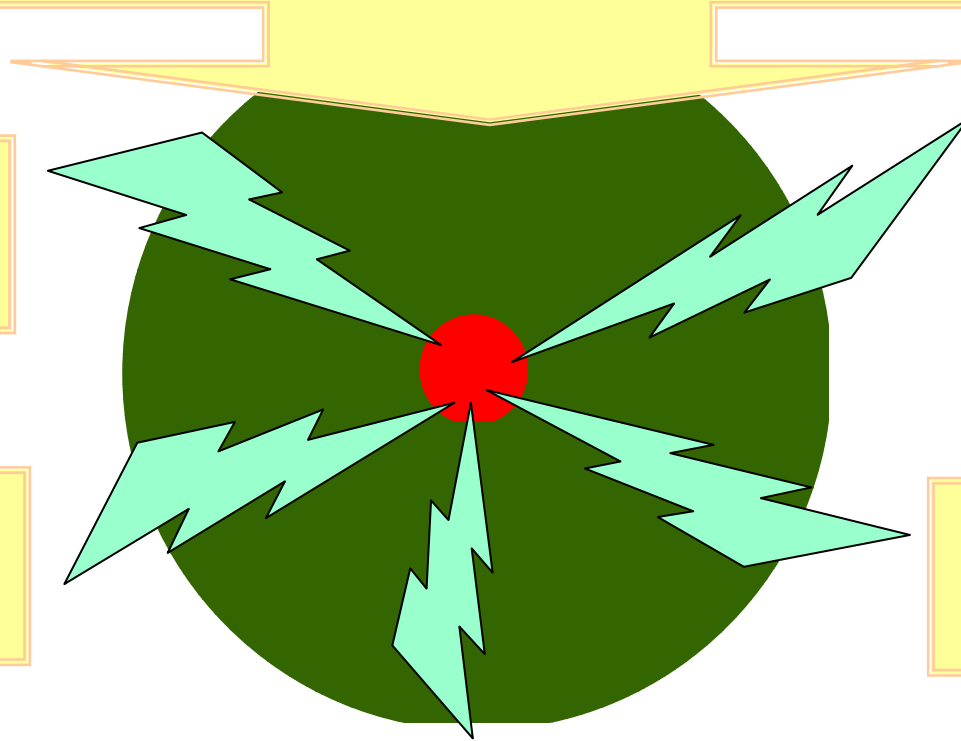# Rai Way Objectives

Efficiency enhancements and cost reduction

Centralize the supervision

Improve the service provisioning

Fault Management

Consistent and aligned network inventory

Network circuits planning and configuration

Convergence between objectives and tecnology

◆ **The Rai Way Transport Network uses many different equipments:**

  ➢ SDH Radio links by Siemens and Alcatel

  ➢ ADM by Marconi (SMA family) and Alcatel

  ➢ Cross Connect by Siemens

  ➢ Video codec by Alcatel and video matrix by Probel

◆ **RaiWay has implemented an INMS system**

  ➢ Integrated Network Management System for integrating different vendor Element Managers (mainly by Alcatel and Siemens)

  ➢ Developed by HP and based on architecture based on TMN reccomended standards for Network and service level

INMS Solution

One of the projects realized for RAIWAY by HP is INMS, a custom solution based on Open View TeMIP. Through INMS, RaiWay gained a system capable of automated provisioning on different brands of SDH network equipment for broadcast circuits. The flexibility of this solution allows also RAIWAY to optimize the usage of its network, especially with the ASI and Ethernet circuits, without having to make big investment in new network equipment and technologies. Moreover INMS gives a complete picture of the network features, with the fault management functionalities
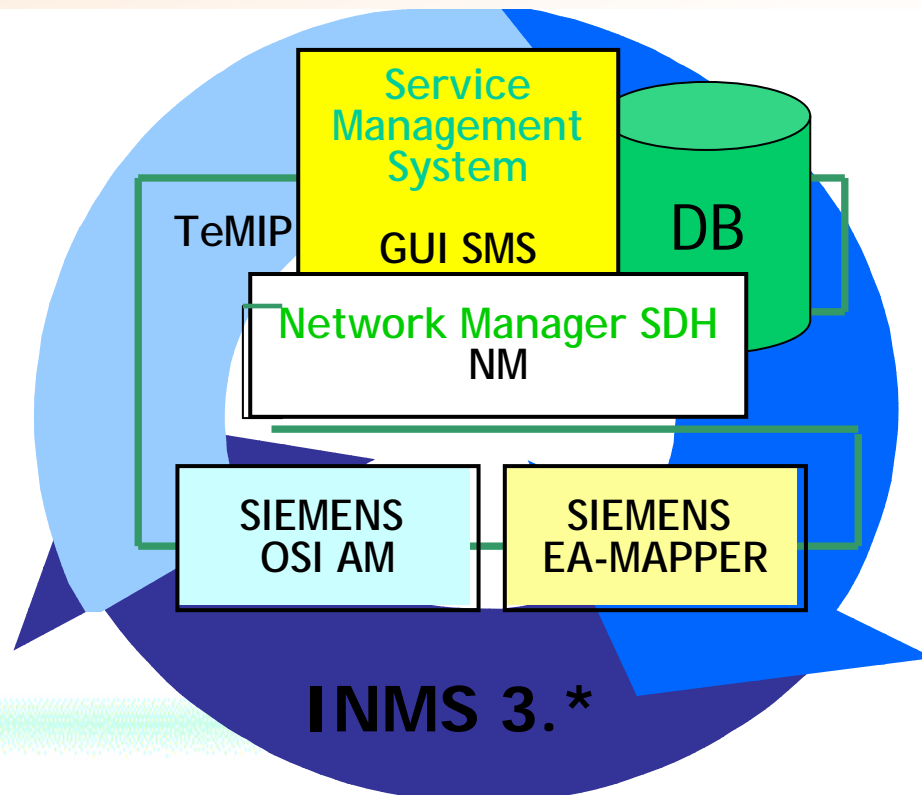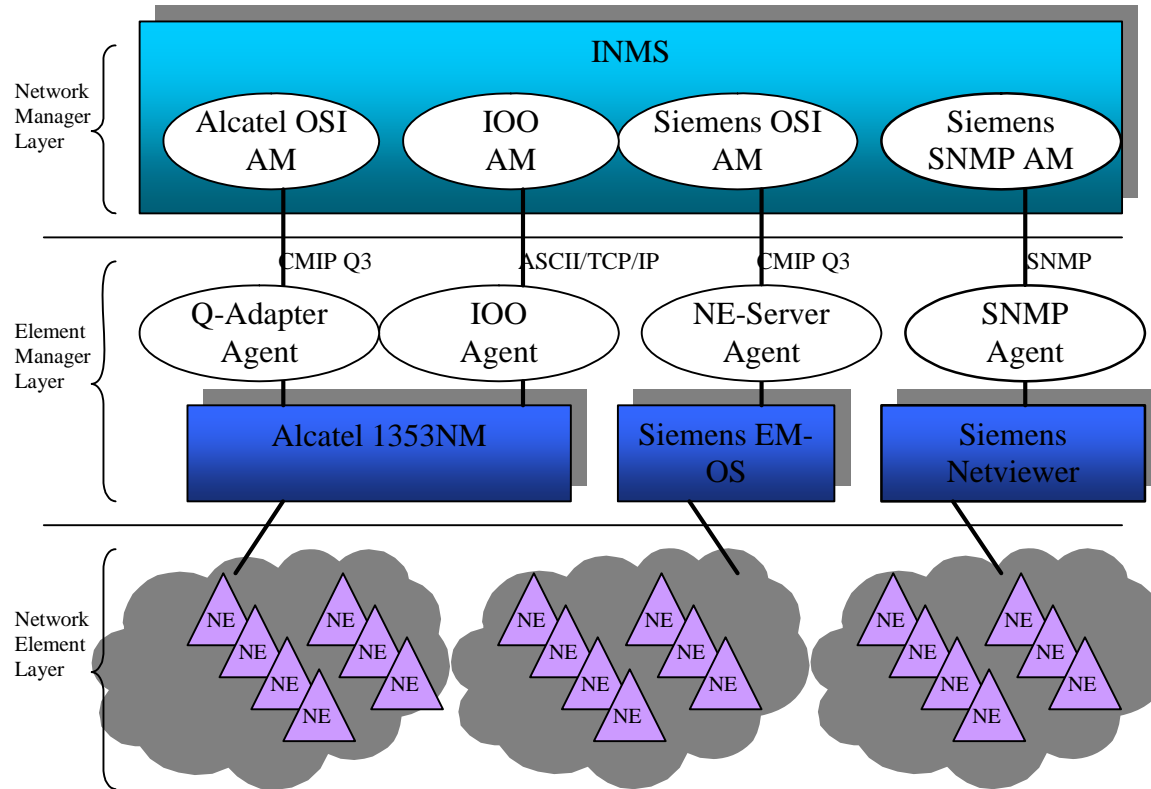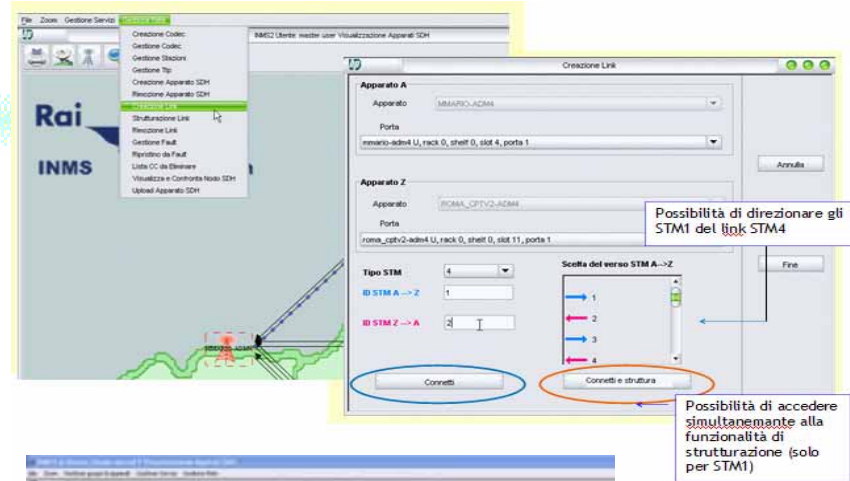
Functional blocks
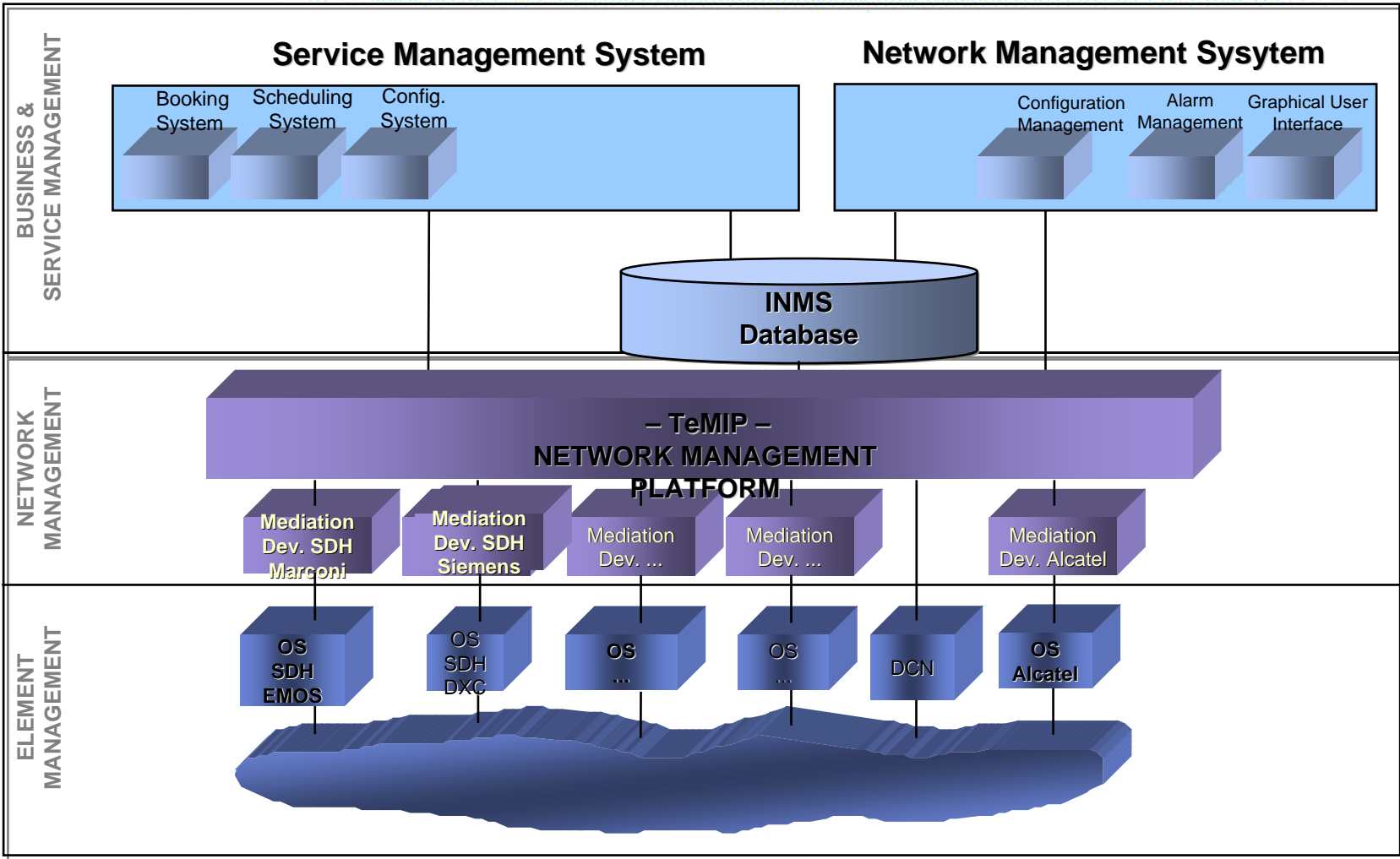
Architecture

INMS Functional Areas

Rai Way

Configuration management

The system has an aligned and consistent knowledge of the network data and determines its configuration in terms of connectivity and payload tributaries.
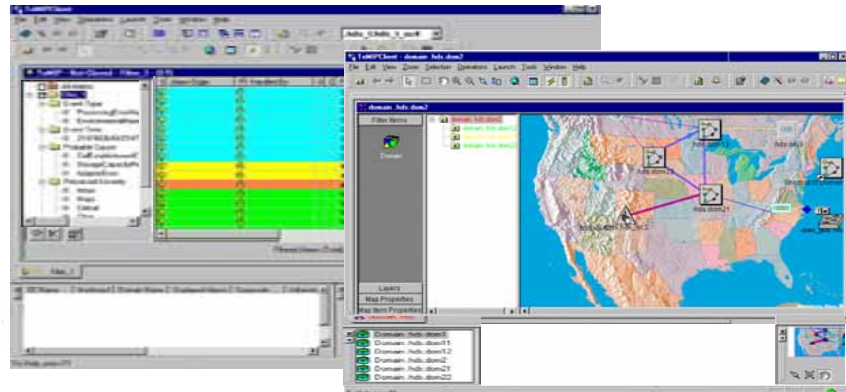
Services provisioning and activation

INMS manages the SDH network, providing adjustments of quick and up-to-date algorithms for calculation and delivery processes

Fault management and services correlation

Physical and logical resource alarms are collected and displayed. The related impacts to the circuits are determined and the proper root cause analysis is also performed and reported.

INMS provisioning architecture

Main features:
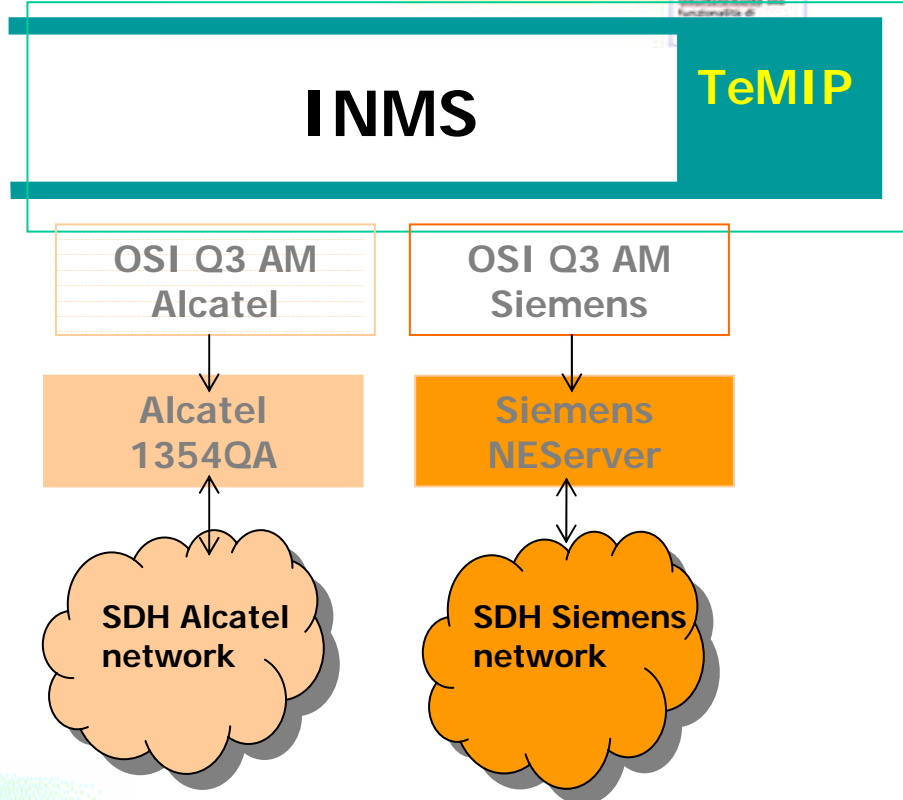
▶ **Multi technology environment**

✓ Alcatel SDH Network
✓ Siemens SDH Network

▶ **Services provisioning**

✓ SDH circuits (2Mb,45Mb,155Mb), broadcast and monocast
✓ ASI circuits
✓ Ethernet circuits

▶ **Mixed trails through Alcatel and Siemens equipments**

▶ **SNCP protection functionality**
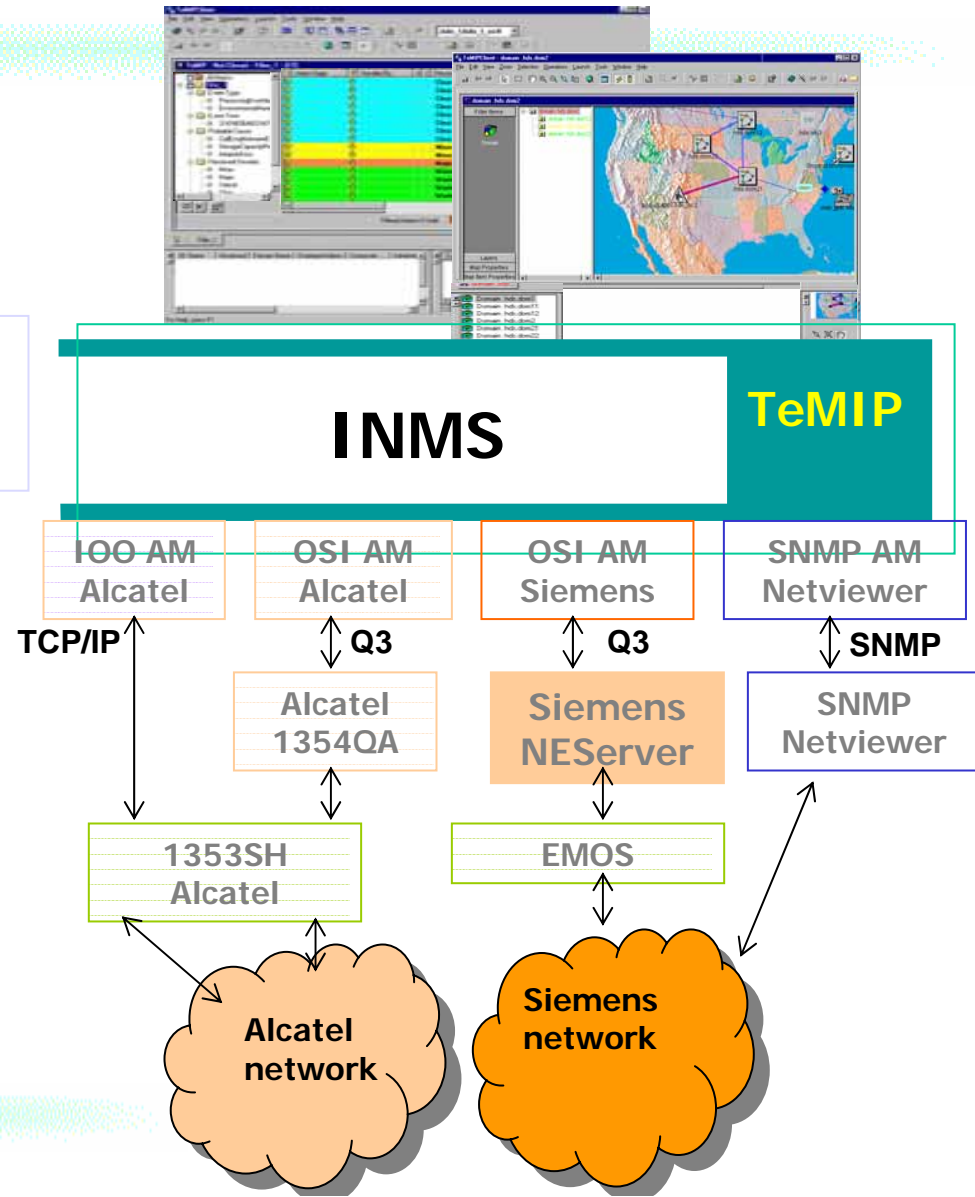
INMS fault architecture

Main features:

Multi technology environment
- ✓ SDH
- ✓ Radio Link
- ✓ Video codec

Fault Management

Service Impact Analysis

Root Cause Analysis

INMS **TeMIP**

IOO AM Alcatel	OSI AM Alcatel	OSI AM Siemens	SNMP AM Netviewer

TCP/IP   **Q3**   **Q3**   **SNMP**

Alcatel 1354QA   Siemens NEServer   SNMP Netviewer

1353SH Alcatel   EMOS

Alcatel network   Siemens network

Asi and Ethernet port management

♦ To manage an Asi or ethernet port is necessary:

➢ Add/Remove bandwidth (add/remove virtual VCn to/from vcGroup) to a Physical port (multiTechonologyTTPBid object)

➢ Create/Delete Cross Connection between the n concatenated vcnTTPBid and the tunCTPBidirectional, can be unidirectional or Broadcast

➢ Control path activation Path Activation of all the paths involved in virtual concatenation path (this permit to enable/disable the paths after the creation)

INMS concurrent provisioning

Performance issues

• The very particular context of broadcasting, where dynamic lifecycle and unidirectional broadcast services are required, determines the intrinsic distinction of services provided by broadcasting players respect to the traditional phone bidirectional services.
• Performance became a critical issue specially for VCAT circuit, where a massive interaction with the network is foreseen

Concurrent provisioning

• INMS achieves satisfactory results realizing the concurrent and parallel provisioning by means a TeMIP multi threading architecture

INMS

Req.   Req.   Req.

ADM1	ADM2	ADMn
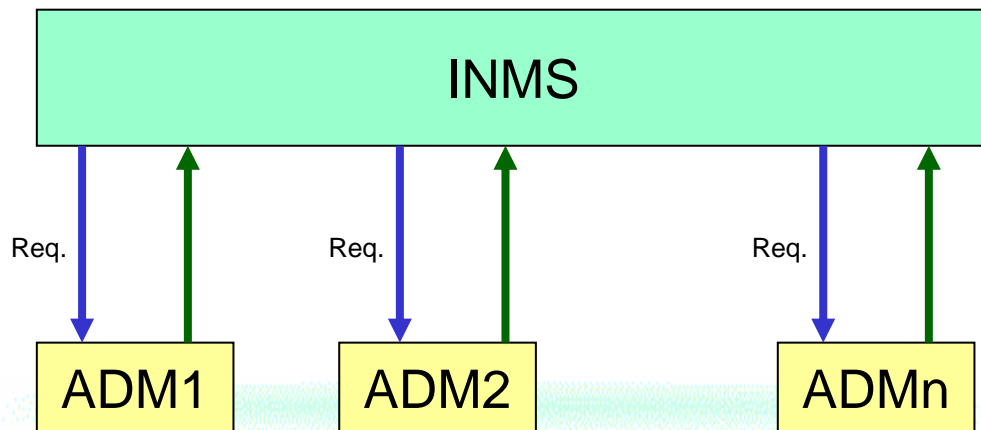
1. In order to optimaze the set up time, INMS interacts with the network in parallel mode

2. Responses are collected by INMS and the setup time depends on the slowest device

INMS Result & Benefits

♦ **Simplicity**

➢ Circuit configuration and activation are now automatic

♦ **Agility**

➢ Custom-developed graphical user interface makes operators' jobs much easier and faster

➢ RAI Way can deliver appropriate service levels in terms of quality and timeliness

➢ INMS enables Rai Way to provide NG-SDH service (ASI & Ethernet)

♦ **Added Value**

➢ INMS enables RAI Way to deploy SDH network equipment from different vendors—promoting a competitive scenario and enabling RAI Way to realize cost savings

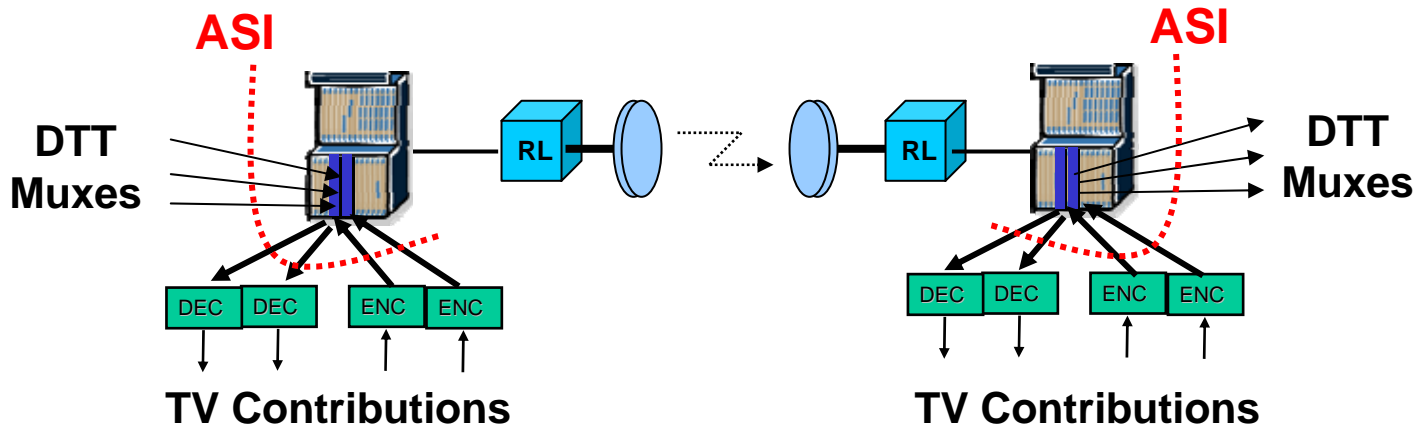➢ Customer satisfaction levels have improved markedly

RaiWay Television Contribution and Distribution Network

Comparison between SDH and NG-SDH
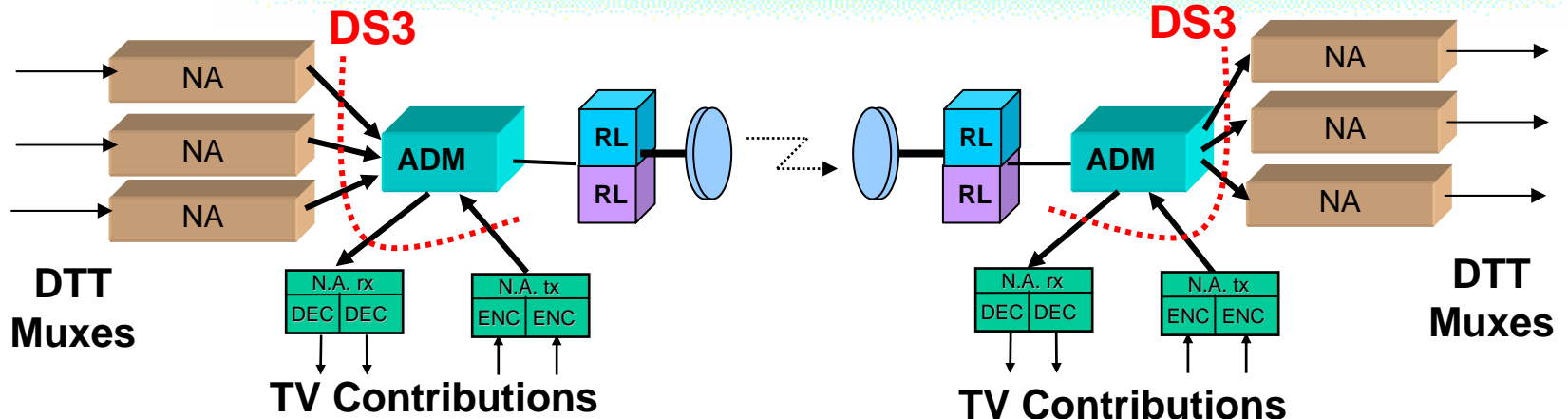
Classic SDH solution

New NG-SDH solution

Evolution of the transport network

1999

- Switch to SDH technology from a analogue network infrastructure
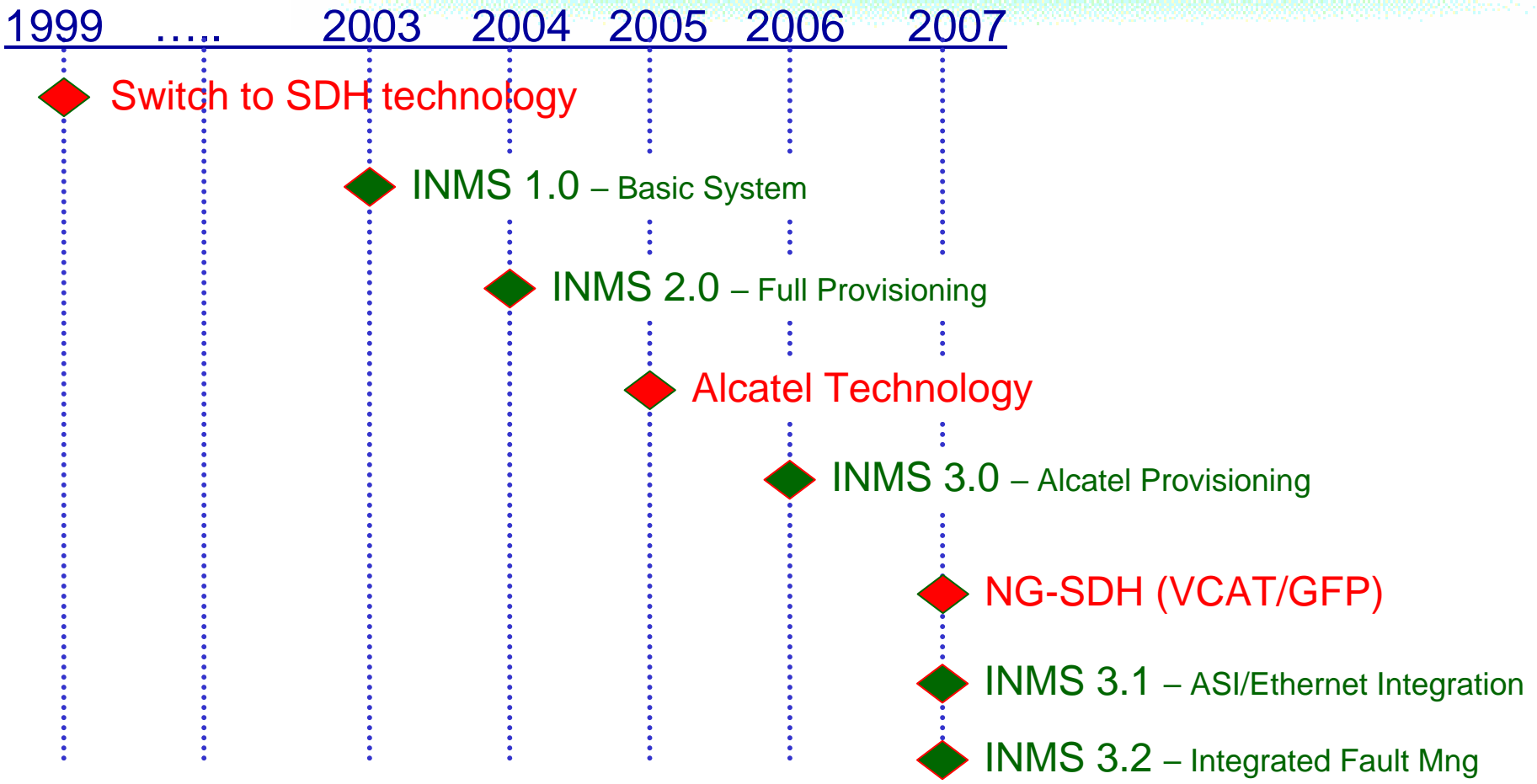- Mono Vendor Environment base on Siemens platform

2005

- The network becomes multi-vendor
- Siemens & Alcatel

2007

- Introduction of NG-SDH features (VCAT & GFP)
- ISA-ASI board & ISA Ethernet board

INMS Delivery: Project Releases

1999 ..... 2003 2004 2005 2006 2007

◆ Switch to SDH technology

◆ INMS 1.0 – Basic System

◆ INMS 2.0 – Full Provisioning

◆ Alcatel Technology

◆ INMS 3.0 – Alcatel Provisioning

◆ NG-SDH (VCAT/GFP)

◆ INMS 3.1 – ASI/Ethernet Integration

◆ INMS 3.2 – Integrated Fault Mng

HP INMS capable of adapting to the network change