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Technology 101

Signaling Monitoring



Index

- ❖ Introduction to Signaling
 - [What is Signaling? What is a Signaling Network?](#)
 - [Voice and SS7 Networks](#)
 - [Why Monitor the Signaling?](#)
 - [Signaling Analyzer - Options](#)
 - [Monitoring Balanced E1 Lines](#)
 - [Monitoring Unbalanced E1 Lines](#)
- ❖ RAD's Unique Solutions for Signaling Monitoring
 - [Non-grooming Method](#)
 - [Grooming Method](#)
 - [Carrier Environment](#)
 - [Cellular Environment](#)
 - [DXC Product Line Overview](#)
 - [The DXC Family of Solutions](#)
 - [Advantages of RAD's Grooming Solution](#)
 - [Example 1: The Smallest Monitoring Unit](#)
 - [Example 2: Grooming in the ADM](#)
 - [Example 3: Transporting Signaling over the IP Network](#)
 - [Example 4: VoIP](#)
 - [Customer References](#)
- ❖ [Contact Us](#)

What is Signaling?

What is a Signaling Network?

- ❖ Signaling is control information that enables the operator or user to obtain network and/or user information for network management or for providing additional services from a central location. Signaling information can be carried in-band (e.g., timeslot 16) or out-of-band.
- ❖ A signaling network is an out-of-band path parallel to the voice path which carries control information on separate links. The control network determines call destination status, maps the route, facilitates billing and provides enhanced services such as 1-800, voice mail and credit card calls.



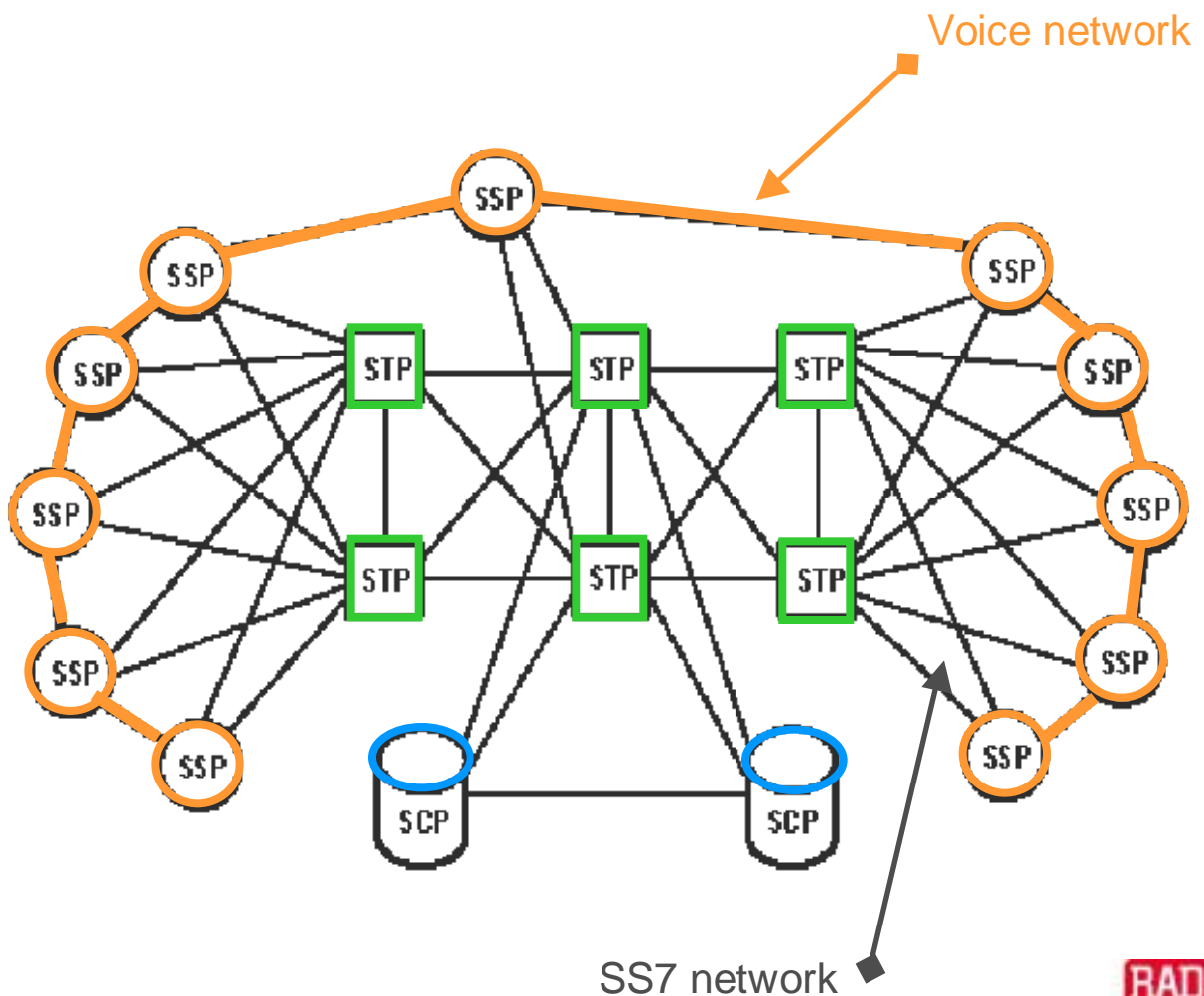
Voice and SS7 Networks

Index

SSP – Service Switching Point – local voice switches (usually class 5 switches).

STP – Signal Transfer Point – packet switches that provide access to SS7 network. Relay messages between SSPs.

SCP – Service Control Point – computers that contain customer and network information in databases.



❖ **Central management and control**

- Reduce downtime
- Detect overloaded switches
- Ensure correct billing
- Reduce delays
- Ensure network security
- Detect fraud

❖ **Quality of Service (QoS)**

Any user of leased lines that needs real-time maintenance information (carriers and enterprises)

❖ **Enhanced telephony services**

Additional, user-defined services such as credit card calls, voice mail, fax storage, SMS and data services.

❖ **Third-party services**

- Interconnection billing
- Marketing information and user statistics
- Competitive information
- Caller location and details (e.g., call tracing for law enforcement)

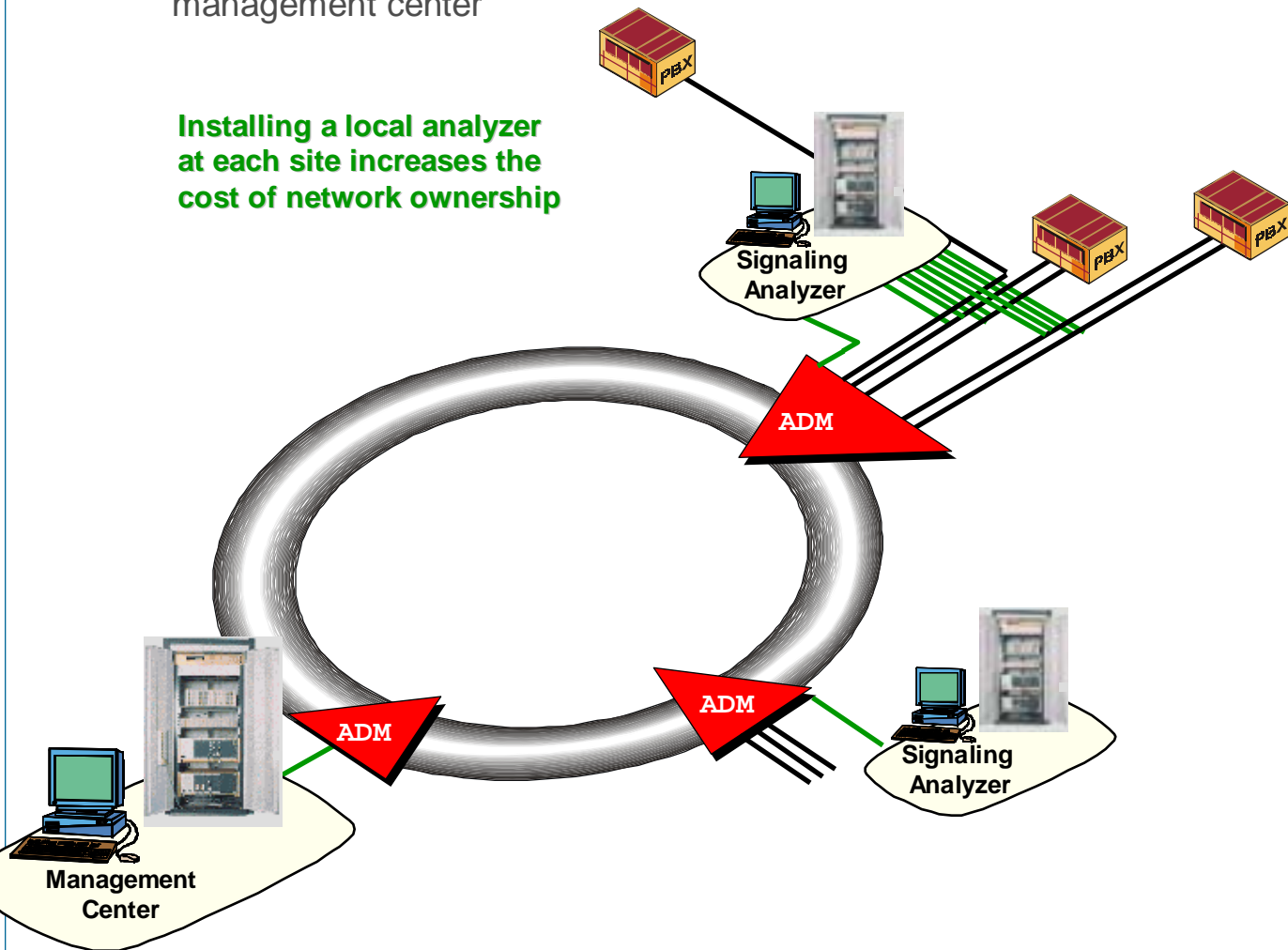
Reduced Costs and Increased Revenues

Signaling Analyzer - Options

Index

- ❖ Local analyzer at each site
 - Analyzed information sent from remote sites to the management center

Installing a local analyzer at each site increases the cost of network ownership



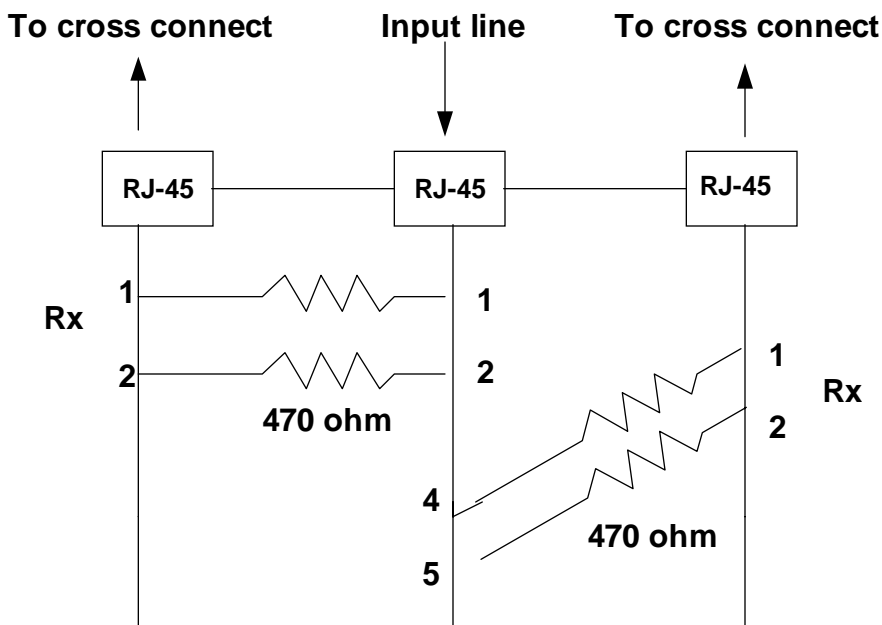
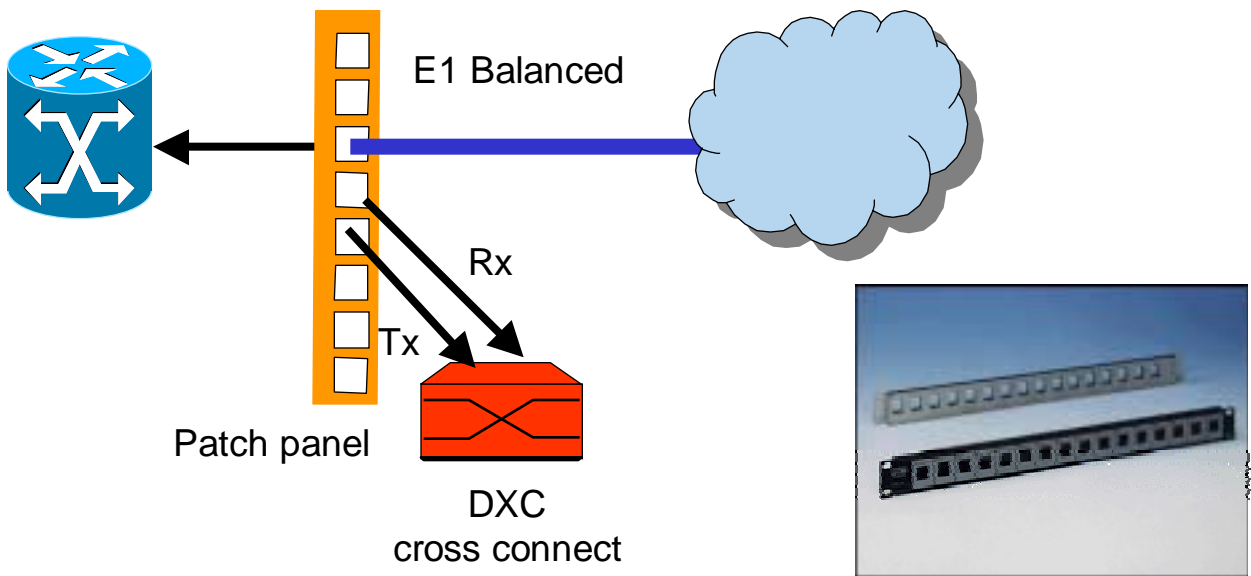
- ❖ One central analyzer
 - More cost-effective
 - Signaling timeslots sent from remote sites to the management center

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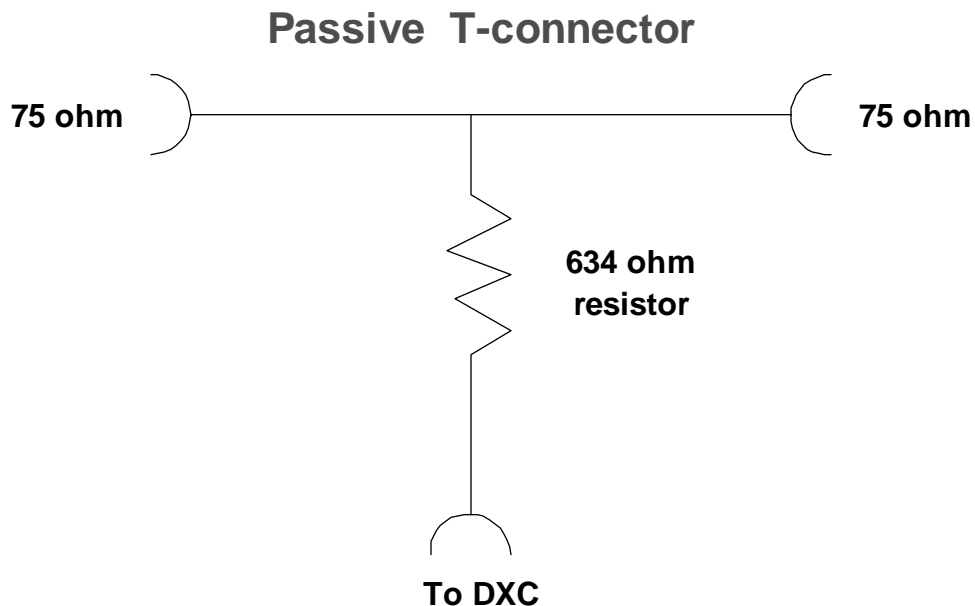
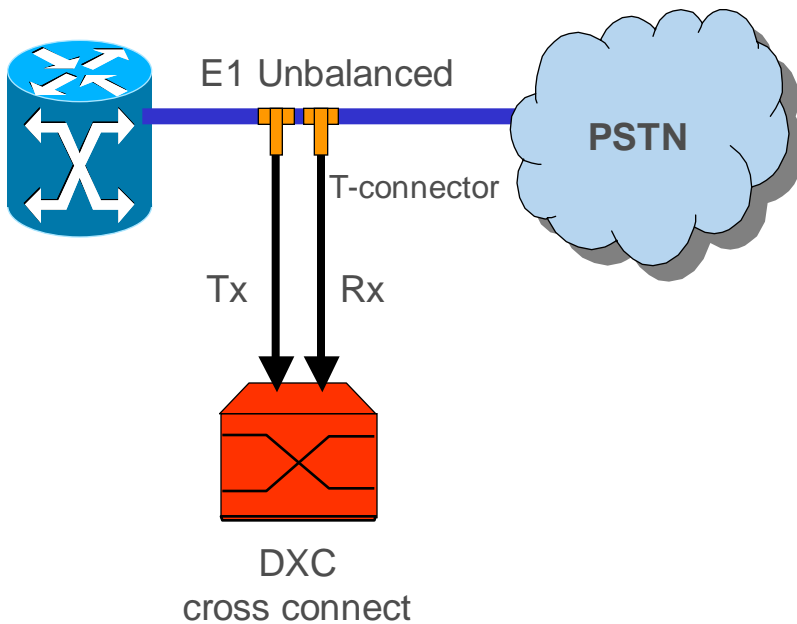
Monitoring Balanced E1 Lines

To save costs and increase efficiency, most operators install one central signaling analyzer. A patch panel sampler is used to divert timeslots to the analyzer from balanced E1 lines.



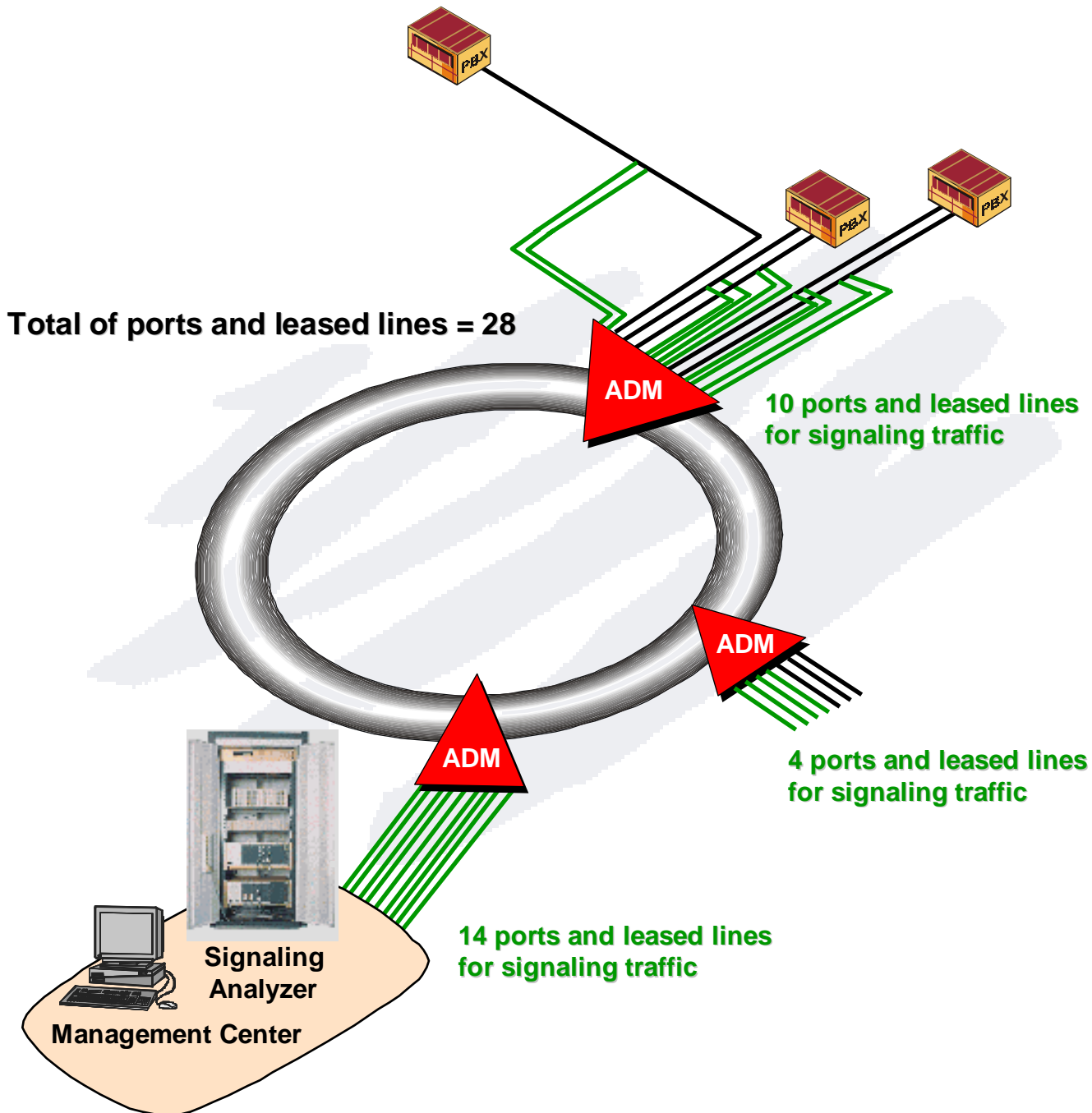
Monitoring Unbalanced E1 Lines

To save costs and increase efficiency, most operators install one central signaling analyzer. A T-connector sampler is used to divert timeslots to the analyzer from unbalanced E1 lines.



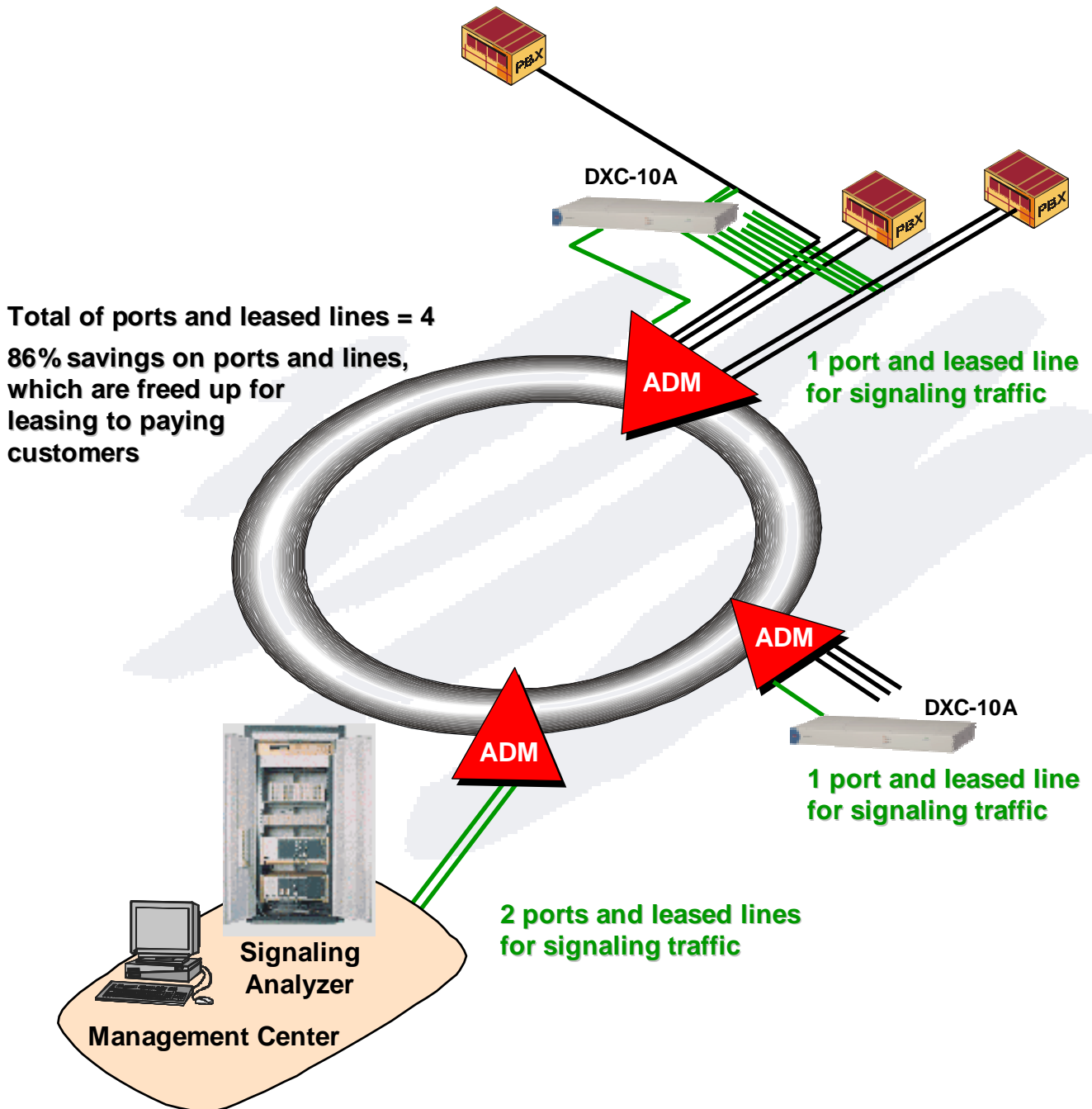
Non-grooming Method

Sending timeslots to central analyzer **without grooming**



Grooming Method

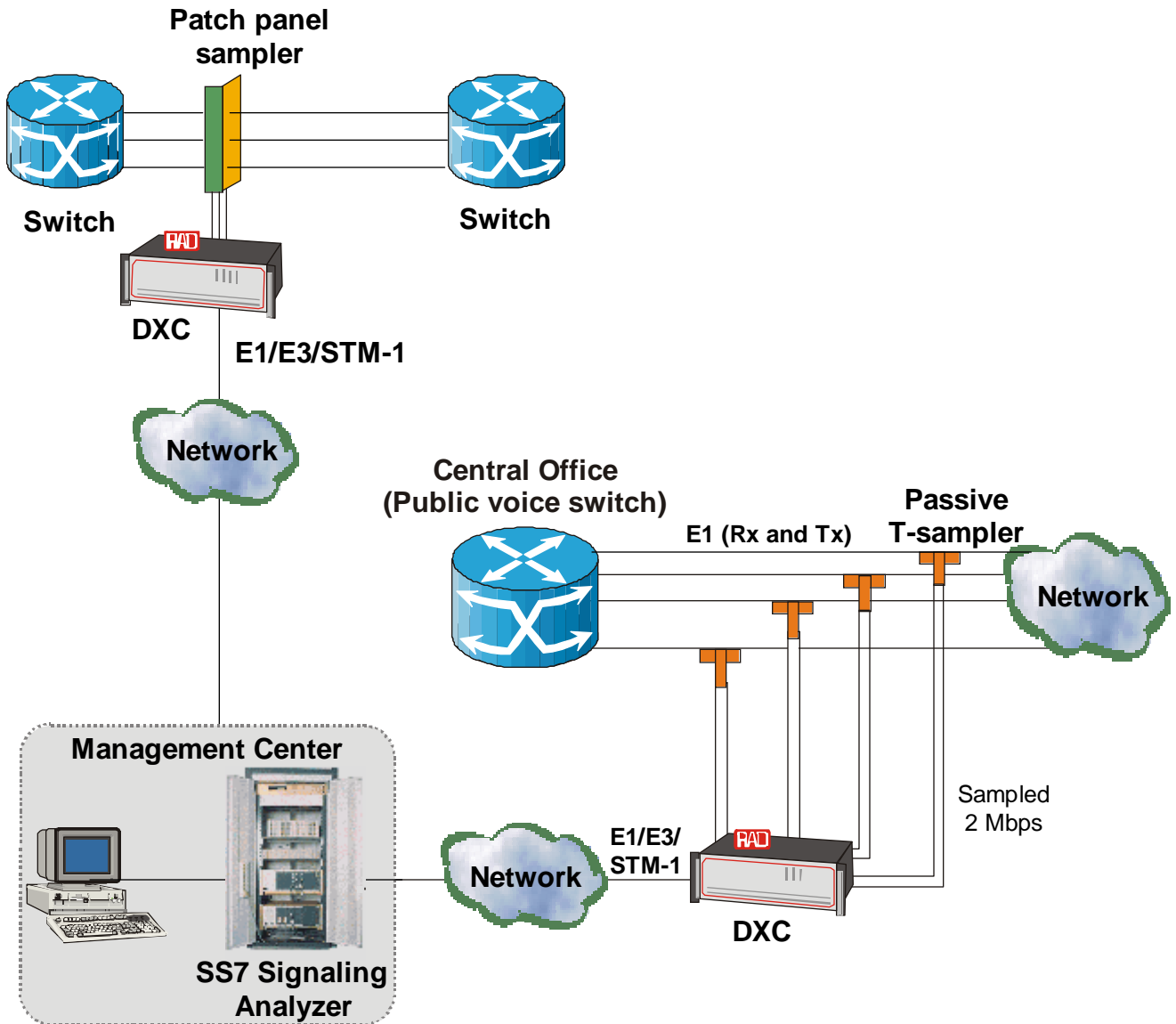
Sending timeslots to central analyzer **after grooming on-site**



Carrier Environment

Index

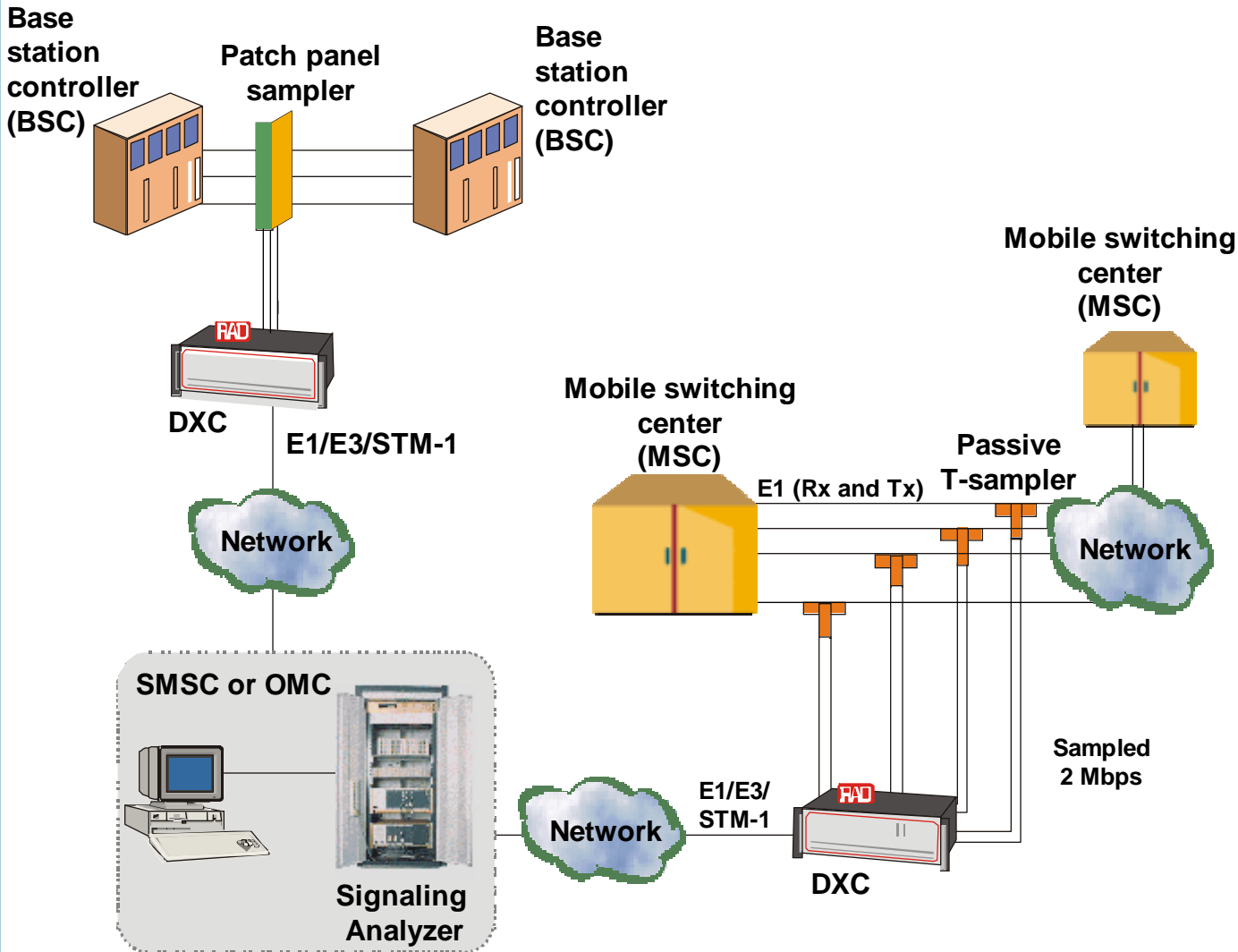
Sample connectivity via patch panel or T-connector



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Cellular Environment

Sample connectivity via patch panel or T-connector



DXC Product Line Overview

Index

- ❖ The DXC product line includes several models:
 - DXC-8R™ – 1U high
 - DXC-10A™ – 1U high
 - DXC-30™ – 3U high
 - DXC-30E™ – 6U high
 - DXC-STM-1™ – 7U high
- ❖ The DXC product line has a wide installed base with thousands of installations around the world.
- ❖ The DXC family of modular multiservice access nodes provides non-blocking cross connection of up to 960 DS0s for up to 120 fractional E1/T1 ports.
- ❖ DXC supports built-in Local Loop solutions.
- ❖ Plug-in interface modules support n x 56/64 kbps, E1, T1, E3, T3, STM-1. The DIM module provides inverse multiplexing capabilities of up to 8 x E1 or 8 x T1.
- ❖ The DXC-STM-1 unit provides a solution for SDH ADM connectivity and 1/0 cross connect in addition to its aforementioned capabilities.
- ❖ Transmission over copper, fiber or HDSL



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The DXC Family of Solutions

Index

DXC-10A (No redundancy)



- 1U high
- One power supply and common logic
- Five I/O slots, offering up to 40 ports
- Grooms up to 38 timeslots onto two E1 lines

DXC-8R (Fully redundant)



- 1U high
- Two power supplies and common logic
- Four I/O slots, offering up to 32 ports
- Grooms up to 31 timeslots onto one E1 line

DXC-STM-1



- 7U high
- One or two power supplies and common logic
- Includes STM-1 terminal/ADM and DXC-30
- 15 I/O slots, offering up to 141 ports
- Grooms up to 112 timeslots onto STM-1

DXC-30



- 3U high
- One or two power supplies and common logic
- 15 I/O slots, offering up to 120 ports
- Grooms up to 116 timeslots onto four E1 lines

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Advantages of RAD's Grooming Solution

Index

- ❖ Ability to send signaling traffic over any network (e.g., payload over SDH and signaling over IP)
- ❖ Cost-effective
- ❖ Simple deployment; indoor or outdoor
- ❖ Smallest solution on the market (1U chassis)
- ❖ High port density: up to 40 ports in 1U chassis or 120 ports in 3U chassis
- ❖ Integrates with any existing system
 - Complies with G.703, G.704, G.706, G.732 and G.823
- ❖ Grooms any timeslot to a variety of trunks, including n x 56/64 kbps, E1, E3, HDSL, IDSL, STM-1, T3 G.747

Continued...

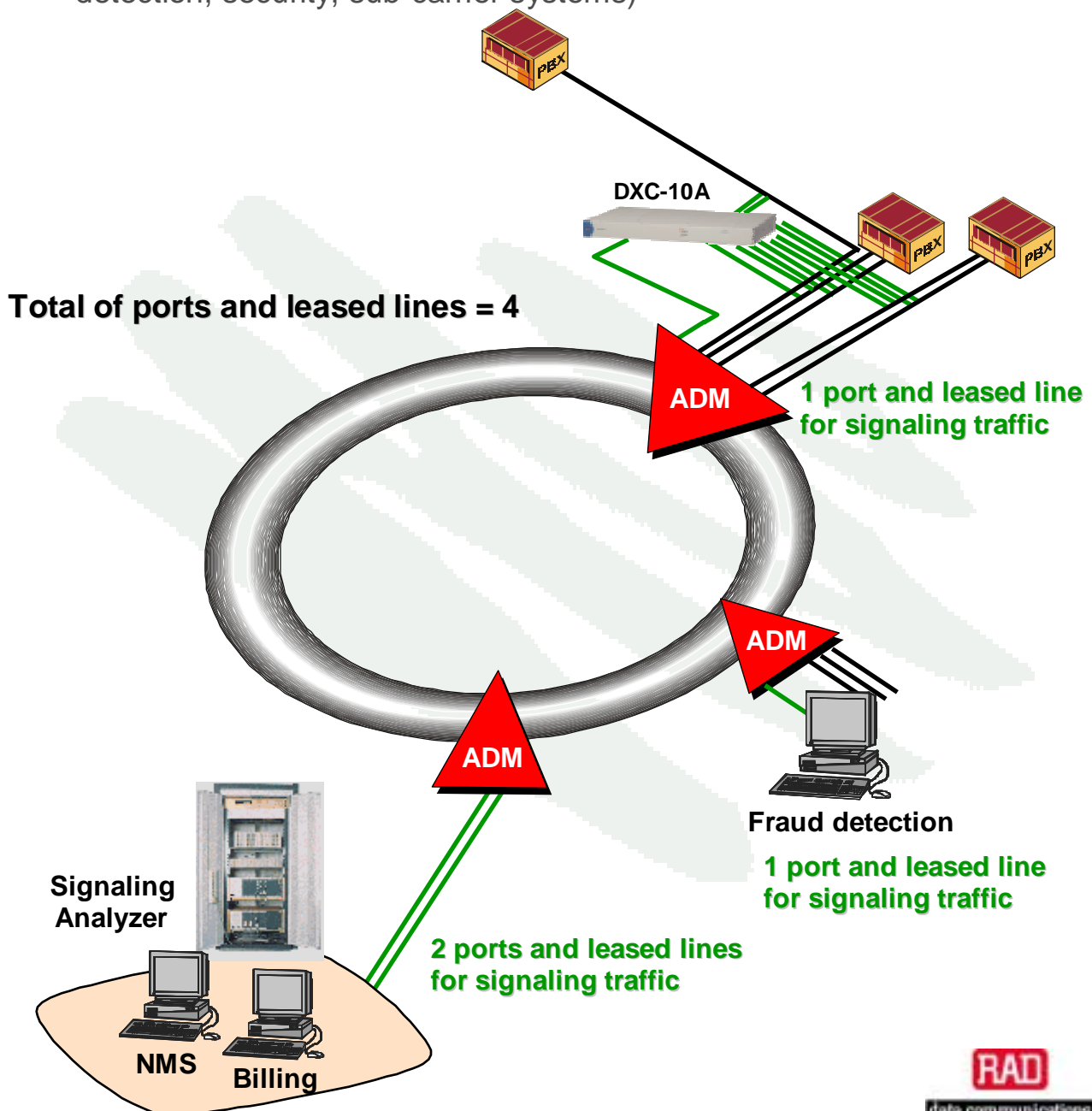
RAD solution – Direct grooming of any timeslot into fuller trunks, carried over an optimized or lower cost network to a centrally located signaling analyzer

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Advantages of RAD's Grooming Solution (continued)

- ❖ One sniffer for many applications
 - Broadcast capability sends same or different timeslots to different applications/locations (e.g., for billing, network management, fraud detection, security, sub-carrier systems)

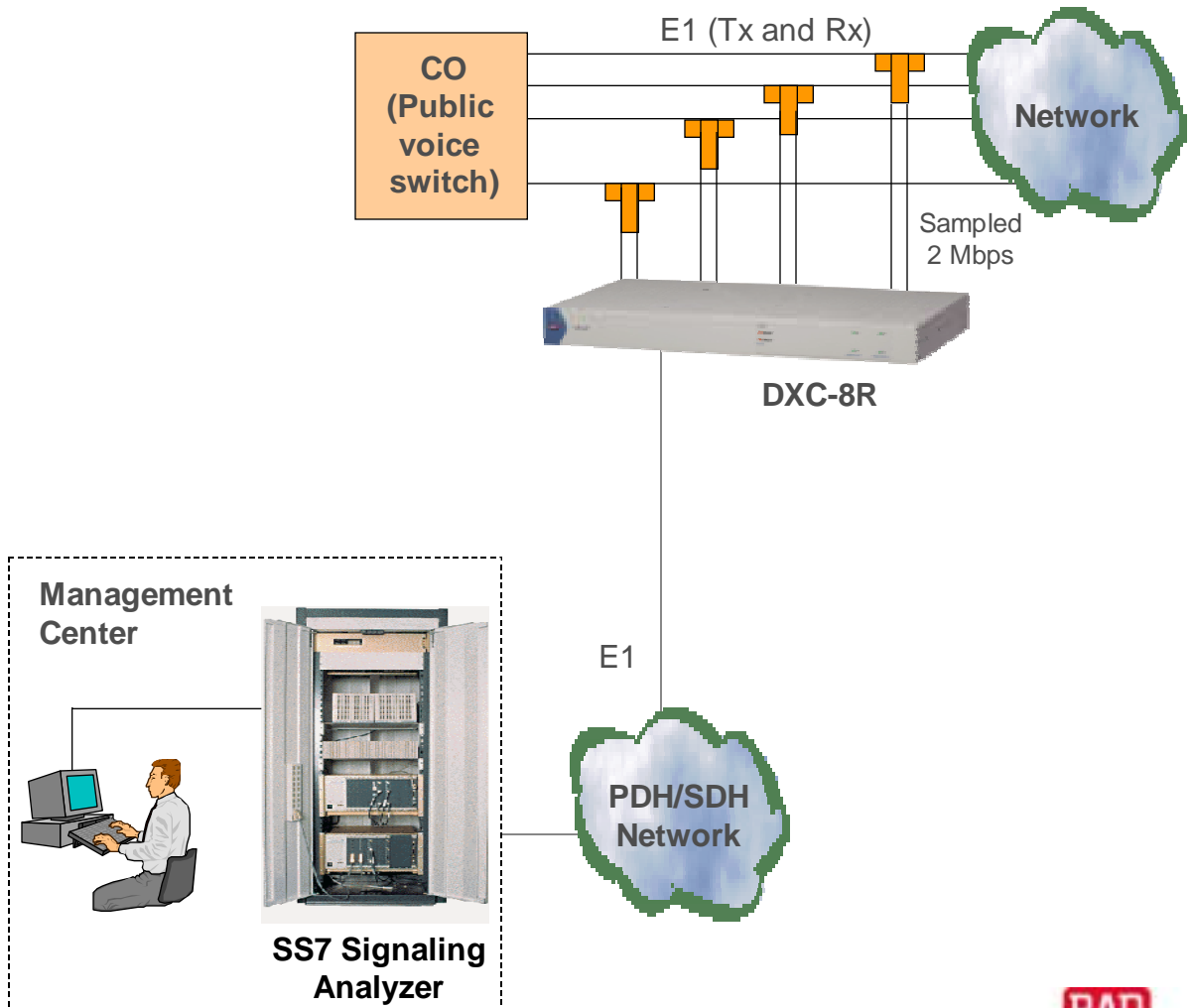


Example 1: The Smallest Monitoring Unit

Index

Benefits of the DXC-8R:

- ❖ 1U high chassis, with full redundancy (power supply, common logic)
- ❖ Four I/O slots (up to 31 timeslots)
- ❖ Capable of monitoring up to 31 E1 lines (grooming 31 timeslots onto a single E1 line, which is sent to the analyzer)
- ❖ High port density with up to eight E1 ports per module (DXC-8E1 module)
- ❖ Cost-effective solution



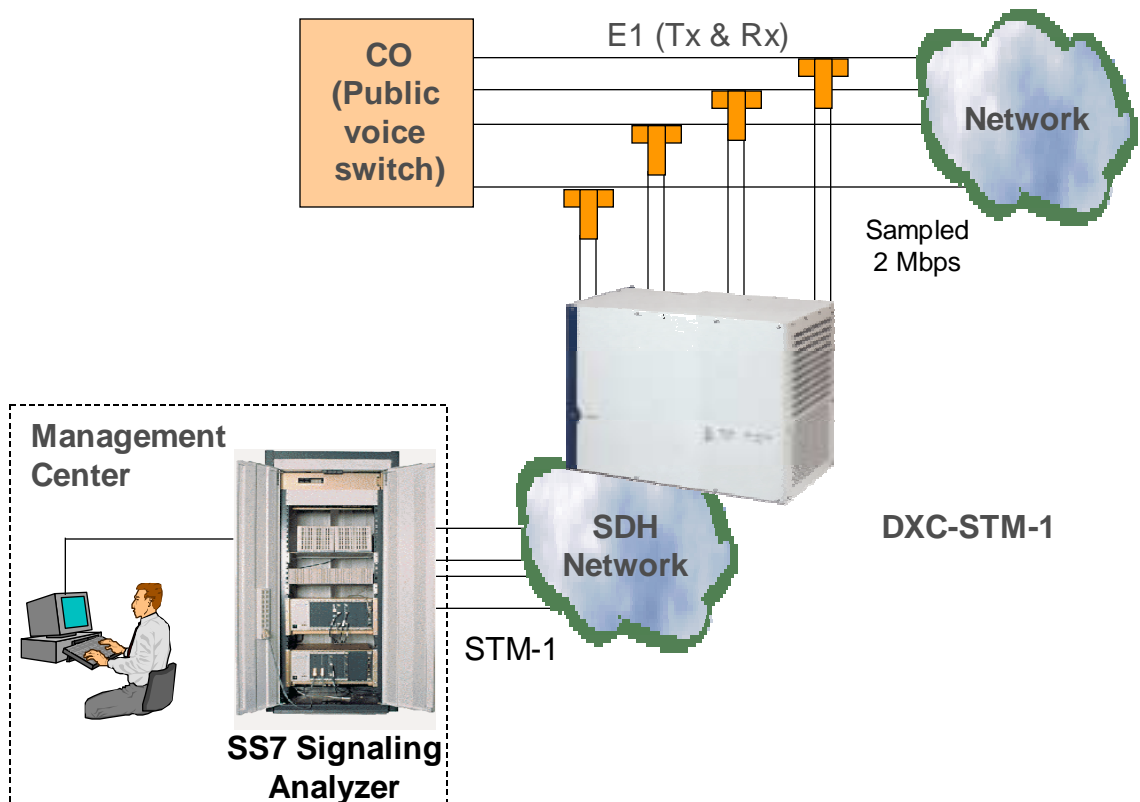
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Example 2: Grooming in the ADM

Benefits of the DXC-STM-1:

- ❖ 7U high chassis, combining an SDH terminal or drop-and-insert multiplexer with a 1/O cross connect; features optional system redundancy (power supply, common logic)
- ❖ 15 I/O slots (up to 120 E1 lines)
- ❖ Capable of monitoring up to 116 E1 lines, grooming 116 timeslots (or 58 input E1 lines) onto STM-1 (four full E1 lines) into the analyzer
- ❖ High port density with up to eight E1 ports per module (DXC-8E1 module)

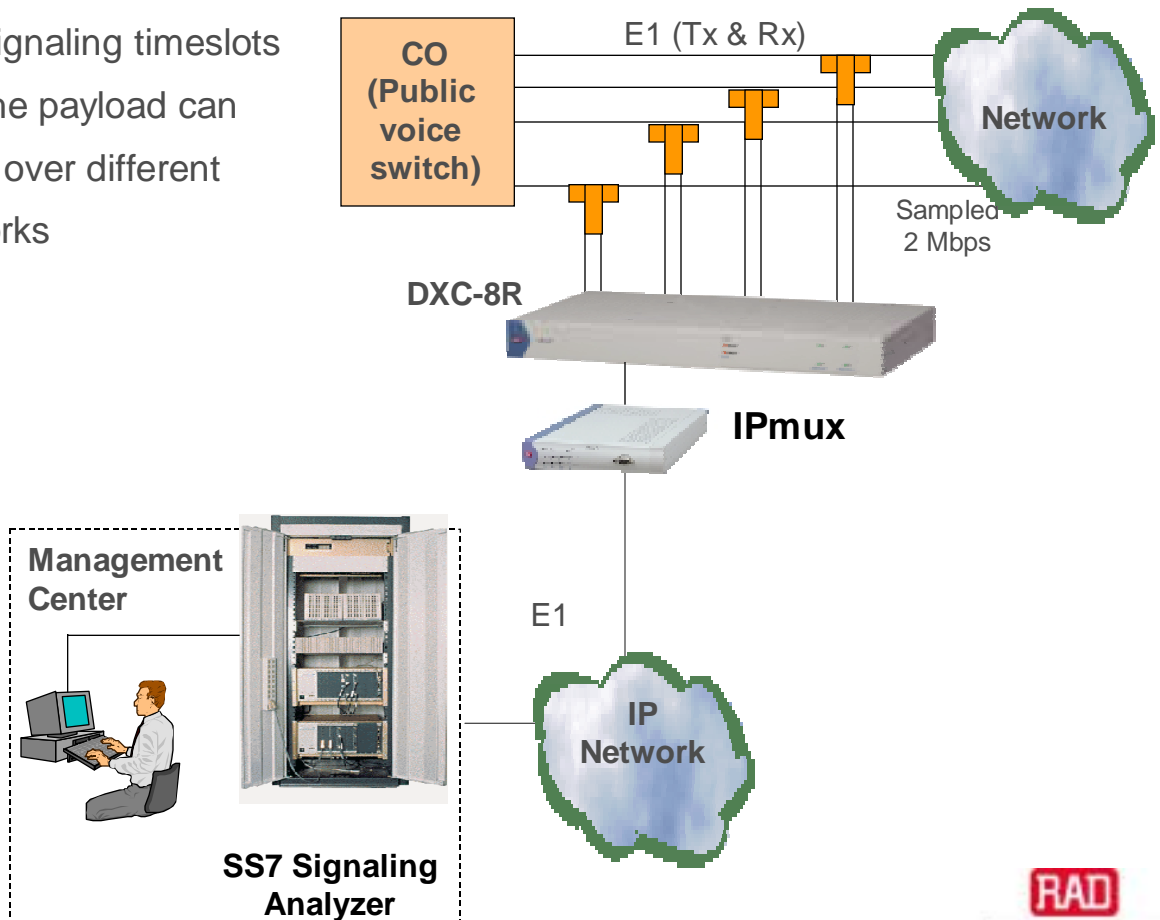


Example 3: Transporting Signaling over the IP Network

Index

Benefits of the DXC-8R and IPmux™ TDMoIP gateway:

- ❖ The DXC is a 1U high chassis with full redundancy (power supply, common logic)
- ❖ Four I/O slots (up to 31 timeslots)
- ❖ Capable of monitoring up to 31 E1 lines (grooming 31 timeslots or 15 E1 lines onto a single E1 line, which is sent to the analyzer)
- ❖ High port density with up to eight E1 ports per module (DXC-8E1 module)
- ❖ IPmux offers a unique TDM over IP (TDMoIP) solution for cost-effective transport of the E1 traffic over an IP network
- ❖ The signaling timeslots and the payload can travel over different networks

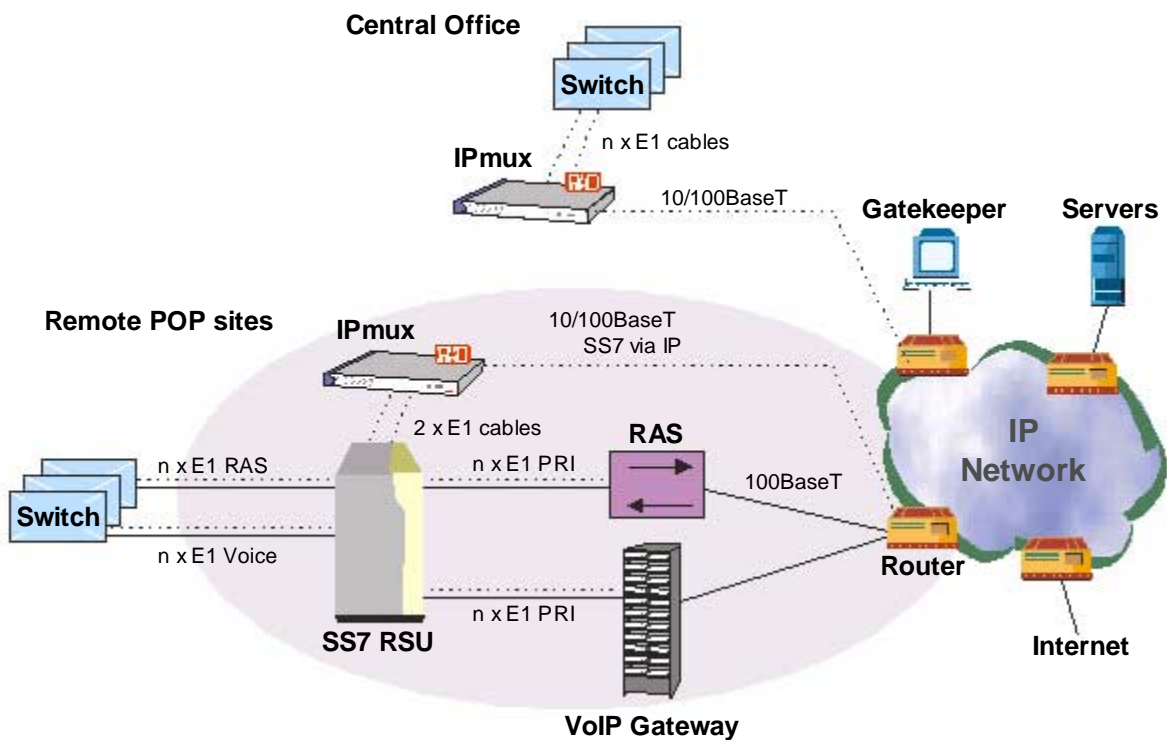


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Example 4: VoIP

- ❖ RAD's IPmux TDMoIP gateways transparently extend TDM circuits over high performance IP backbones
- ❖ Eliminates the need for leased lines to transmit signaling timeslots
- ❖ Complete IP solution
- ❖ Supports all value-added services



Customer References

Index

RAD's DXC is a mature product with a wide installed base of carriers and operators around the world. DXC supports many standards, including n x 56/64 kbps, E1, T1, E3, T3, Fractional STM-1 and ISDN, over fiber, copper and HDSL.

A sampling of testimonials from satisfied customers:

“Instead of using costly analyzers to monitor the SS7 signaling, we manage the system in a simpler and safer way.”

Jose Henrique Zibelberg, Network Manager, Telemar Brazil
(Full story: www.rad.com/cases/telemar.htm)



TELEMAR



“For us, the DXC-8R is an optimal solution, both from a technical and economic standpoint. Equally important, it provides us with the scalability we need to support our expected future growth.”

Shany Elkarat, System Engineer, star*home, Switzerland
(Full story: www.rad.com/cases/star.htm)

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