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# Implementing SS7 Signaling Solutions

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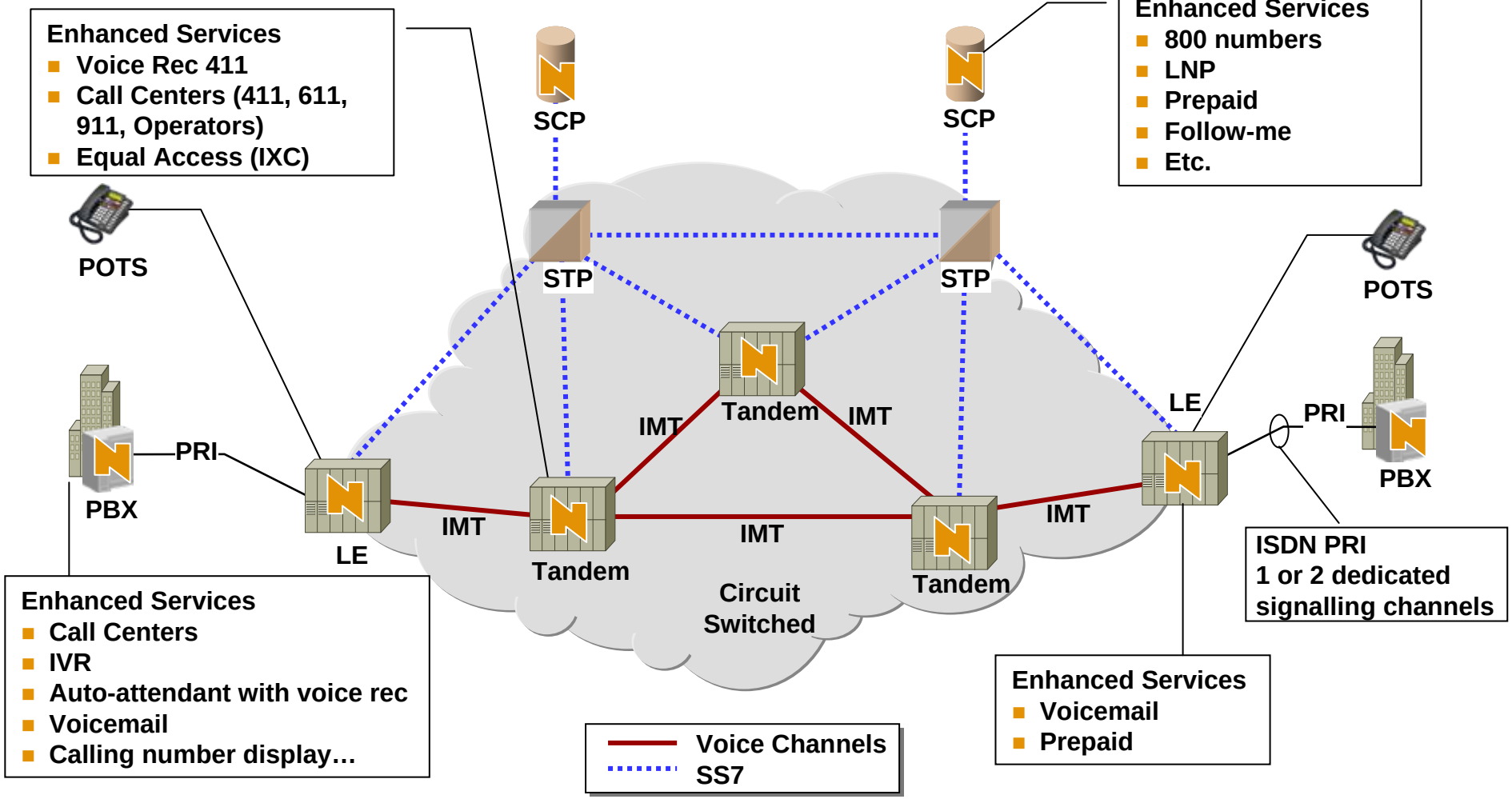
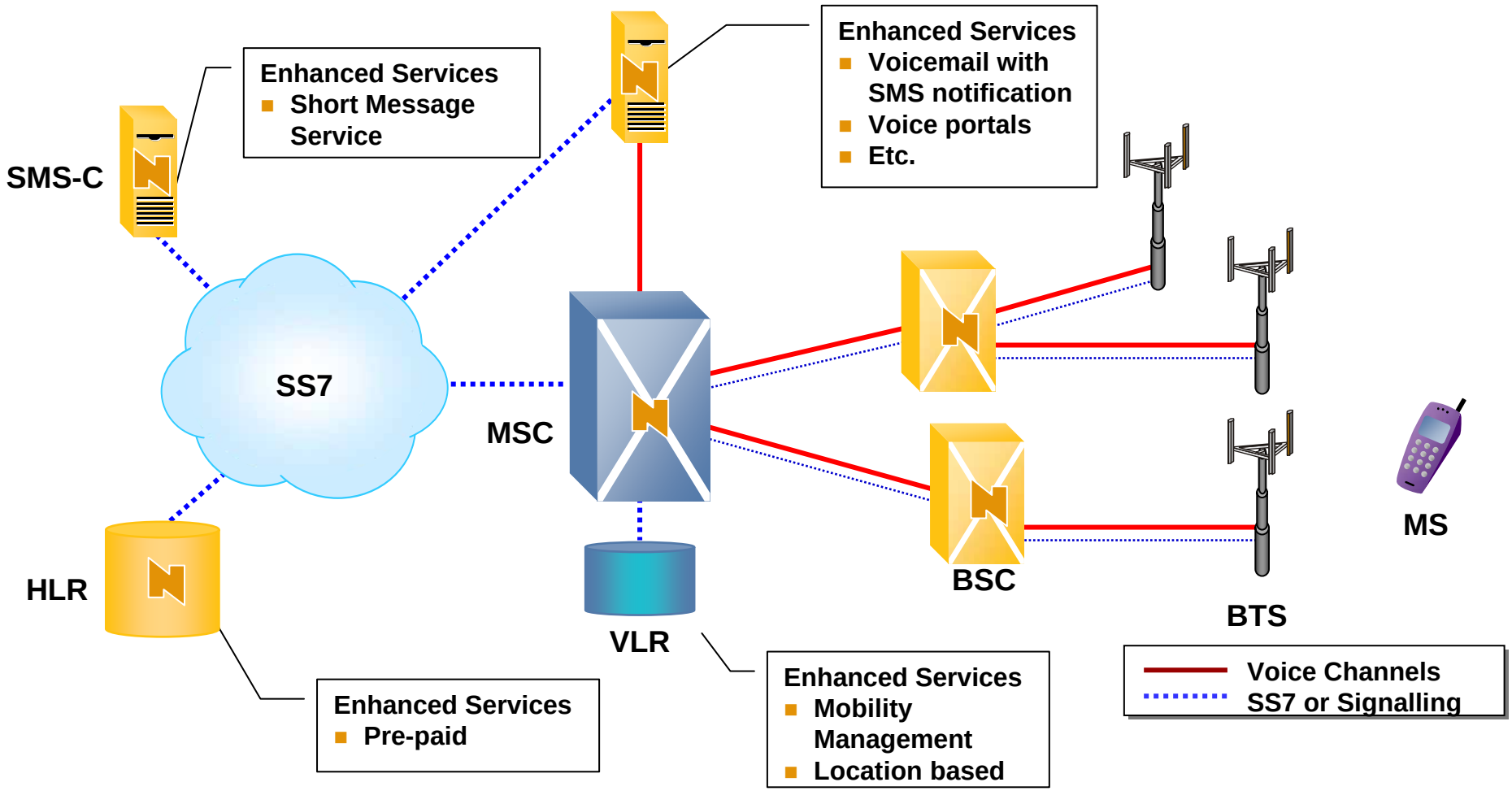
# Agenda

- **SS7 overview**
- **NMS's SS7 products**
  - **SS7 software**
  - **TX 4000(C)**
  - **TX 4000/20(C) replacement for TX 3220(C)**
  - **Carrier-grade feature details**
  - **Passive monitoring feature details**
- **Global interoperability**
- **Upcoming enhancements**

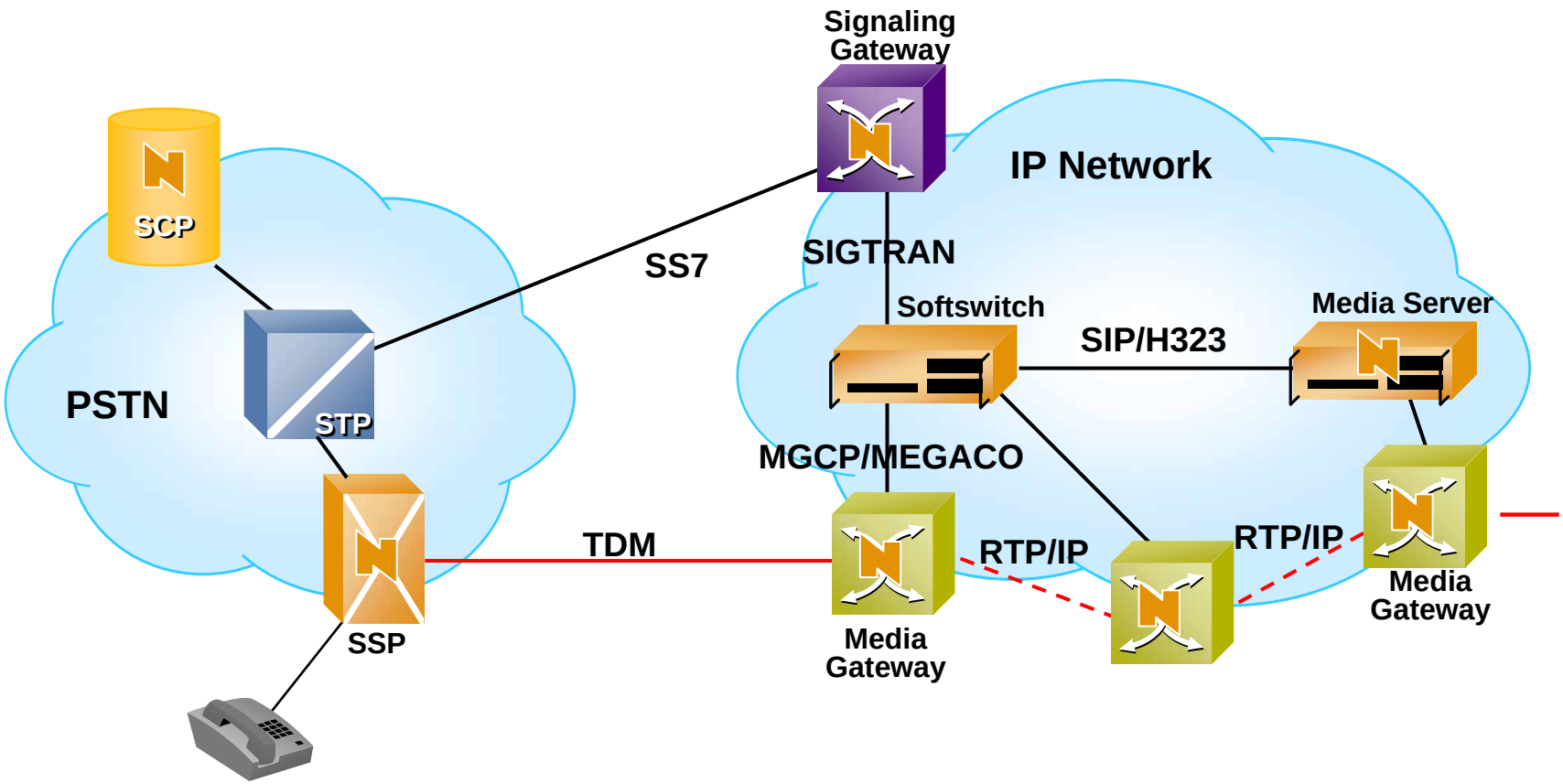
# SS7 and Enhanced Services in Wireline Networks



# SS7 and Enhanced Services in Wireless Networks



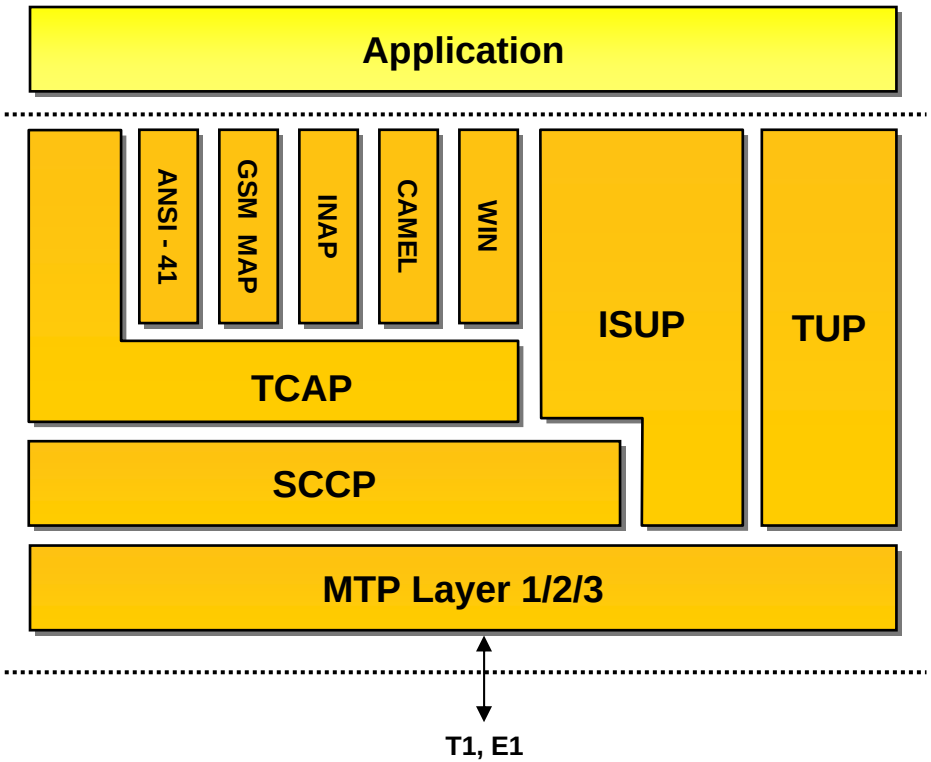
# SS7 in Next-Generation Networks



# Numerous Customer Applications Enabled by NMS's SS7 Offerings

- **Service nodes and intelligent peripherals**
- **Network databases (e.g., Service Control Points)**
- **Switch-enabled peripherals**
- **Gateways**
- **Test equipment**
- **Mobile switching centers**
- **In-building wireless network connectivity**
- **Network presence/location based services**

# SS7 Software Protocol Stacks




- **ISUP / TUP**
  - Set up and tear down calls
- **MAP, CAMEL, INAP**
  - Enhanced wireless and wireline services
- **TCAP**
  - Database look-up for Intelligent Networking
- **SCCP**
  - Subsystem routing
- **MTP3**
  - Routing of messages
- **MTP2**
  - Accurate end-to-end transmission
- **MTP1**
  - Physical layer (E1, T1,… )

# Sample ISUP and TUP Applications

- **Voicemail systems**
- **Debit card centers**
- **Intelligent peripherals**
- **Personalized ringback tones**
- **Anything in the network that needs to accept/make telephone calls**

# Sample TCAP-Based Applications

- **Enhanced 800, Freephone services**
- **Alternate billing systems (e.g., calling card validation)**
- **Local number portability**
- **One Number/Follow Me**
- **Wireless HLR/VLR databases**
- **Intelligent call routing (e.g., geographically distributed ACDs)**
- **Anything in the network that needs to look up information before connecting calls**

# Sample MAP/INAP Applications

- **MAP/ANSI41/CAMEL**
  - **Automatic roaming and system hand-off**
  - **Short Message Service**
  - **Group calls, broadcast calls**
  - **Position location-based services**
  - **Incoming call screening**
- **INAP**
  - **Local Number Portability**
  - **Calling Name Delivery**
  - **IVR systems**
  - **Call center solutions**

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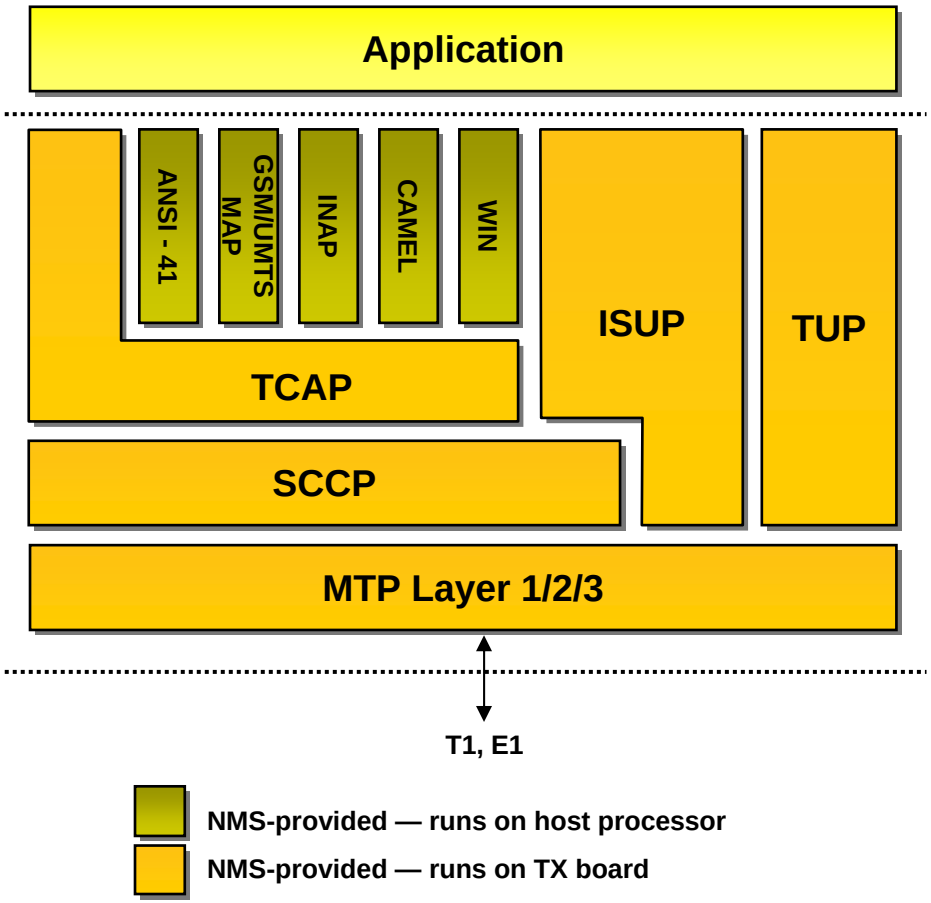
# SS7 Software Protocol Stacks




- **Board-level APIs available**
  - **ISUP, TUP, TCAP, SCCP**
  - **MTP 1/2/3**
  - **Passive monitoring**
- **Host-level APIs**
  - **ANSI41, GSM/UMTS MAP, INAP, CAMEL, WIN**
- **Operating systems**
  - **Solaris (SPARC and x86)**
  - **Windows**
  - **Red Hat Linux**

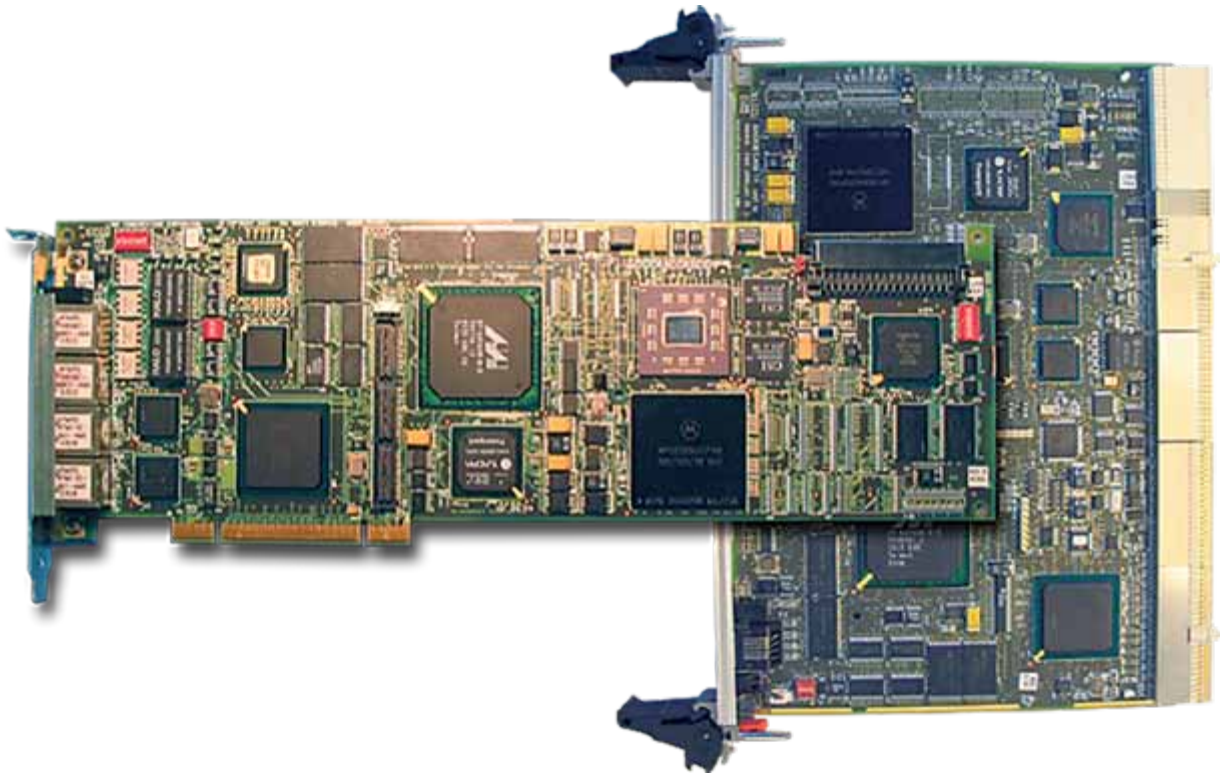
# NMS's SS7 Software Version 4.2

- MTP, ISUP, TUP, SCCP and TCAP protocols
- Point code sharing between two TX boards
  - Board-level support of link redundancy
  - MTP3/ISUP/SCCP/TCAP/TUP
  - Both MTP2 layers active
- Supports multiple point codes on one board
- Configuration of signaling link locations without re-boot
- Passive monitoring
- Global Messaging Toolkit (ISUP)
  - Allows extension of ITU, ETSI, and ANSI standards
- Rich set of application demo programs
- Compatible with Natural Access™ 2005-1
- Competitively-priced licensing options

# Application Part Protocol Layers

- **GSM/UMTS MAP, ANSI-41D, WIN, CAMEL, INAP**
- **Supports broad range of new IN services, wireless and wireline**
- **Dramatically simplifies processing of ASN.1 formatted TCAP messages**
  - **Host-based encode/decode of ASN.1 messages**
  - **Binary libraries, C/C++ API**
- **Sample applications included**
- **Available now**

# TX 4000 Series



# TX 4000 and TX 4000/20 — PCI and cPCI Boards

- **PCI**
  - **4 trunks**
  - **H.100 bus connector**
- **cPCI**
  - **Rear panel I/O with 8 trunks**
  - **Hot swap support**
  - **H.110 bus connection**
- **Software-configurable trunks for T1 or E1**
- **Full node-level redundancy**
  - **Dual Ethernet ports**
- **High-impedance configuration for passive monitoring**

# TX 4000 and TX 4000C

- **High-performance processing**
  - **Over 6 times greater than TX 3220**
- **4, 16 or 32 signaling links**
- **Software-selectable T1 or E1 (120 ohm) trunks**
  - **PCI: 4 trunks**
  - **CompactPCI: 8 trunks**

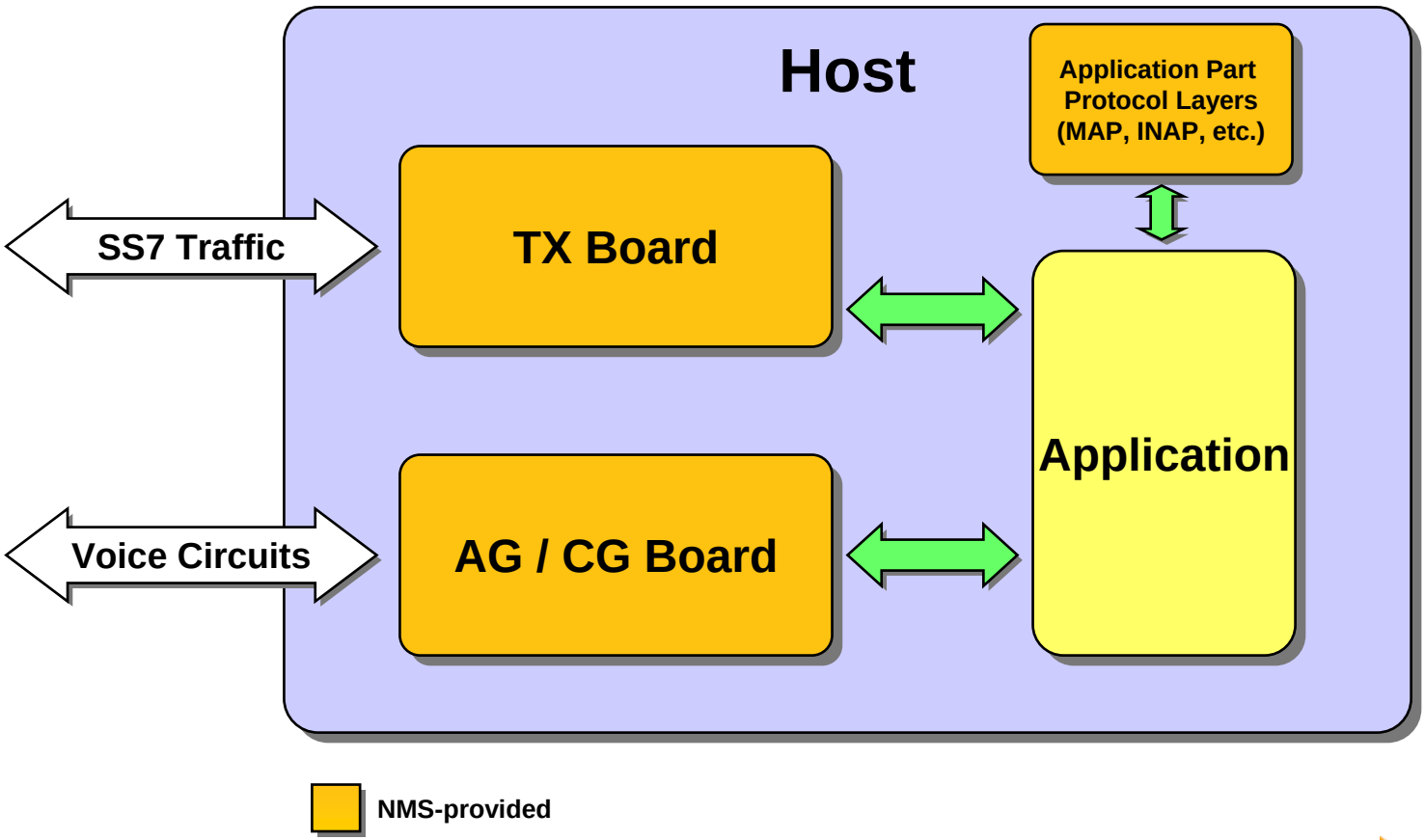
# TX 4000/20 and TX 4000/20C

- **Value-priced SS7 boards**
  - **Throughput processing equivalent to TX 3220(C)**
- **Up to 16 signaling links**
- **Software-selectable T1 or E1 (120 ohm) trunks**
  - **PCI: 4 trunks**
  - **CompactPCI: 8 trunks**

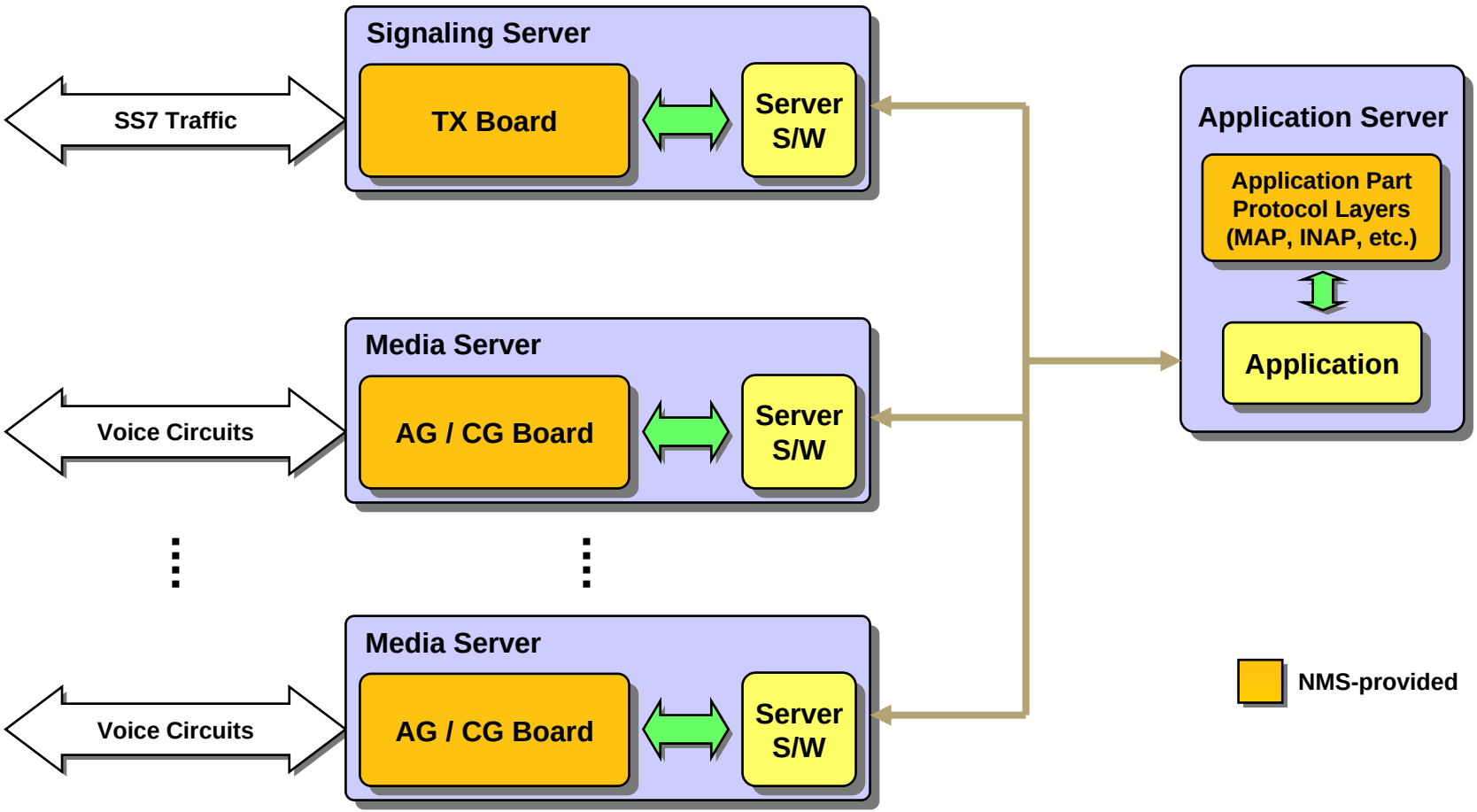
# TX Performance

- **TX 4000(C)**
  - **ISUP: >800 calls/sec (based on 5 messages/call)**
  - **TUP: >1,000 calls/sec**
  - **TCAP: >1,500 transactions/sec (query + response)**
  - **Over 6 times greater than TX 3220**
- **TX 4000/20(C)**
  - **ISUP: 130 calls/sec (based on 5 messages/call)**
  - **TUP: 160 calls/sec**
  - **TCAP: 250 transactions/sec (query and response)**

# Applications: Host-Based Architecture



# Applications: Client/Server-Based Architecture



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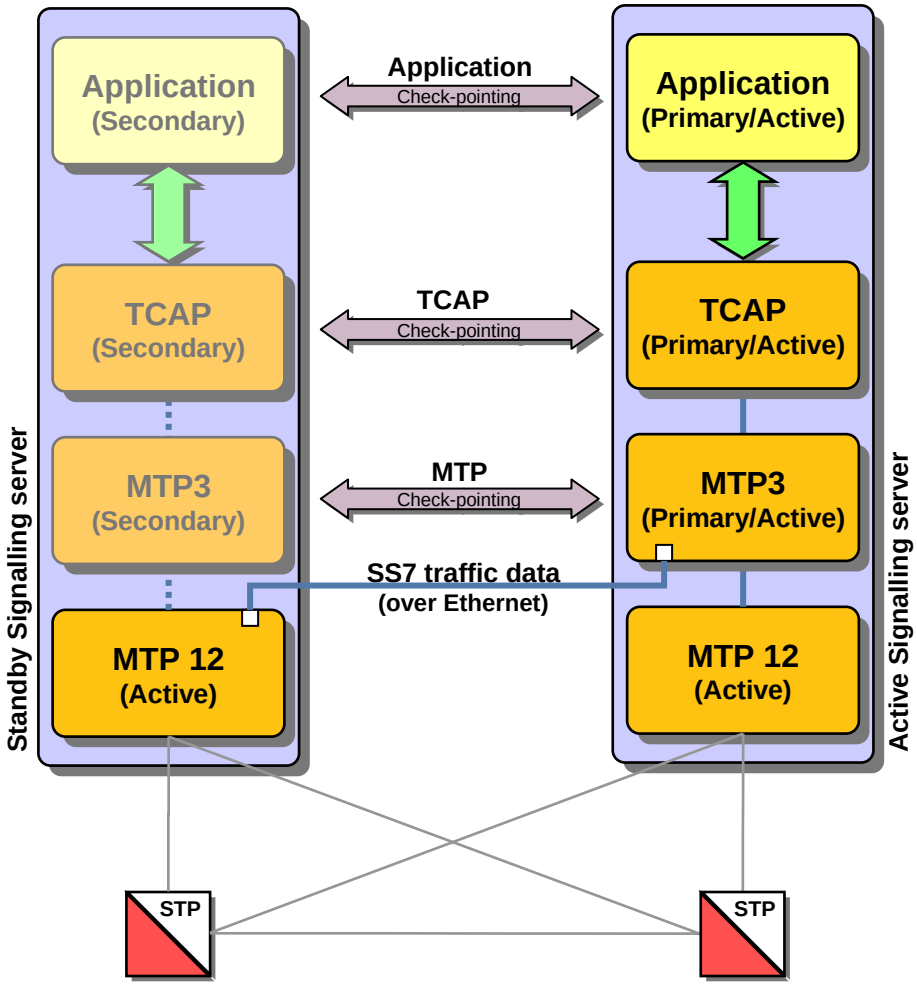
# Carrier-Grade Capabilities with Point Code Redundancy

- **SS7 signaling infrastructure is mission-critical**
- **Protocols designed for maximum availability**
- **NMS's SS7 redundancy benefits**
  - **No single point of failure**
  - **Preserve stable calls and transactions**
  - **Share point code on two boards in different (or same) chassis**
- **Uses distributed model**
  - **Utilizes on-board, high-speed, private Ethernet**
- **Support in MTP3, ISUP, SCCP, TCAP, and TUP**

# Point Code Redundancy Illustrated




- Two SS7 boards share one point code
- Active-Active mode for MTP1/MTP2 layers
- Secondary MTP1/MTP2 traffic routed to primary via dedicated Ethernet
- Active-Standby mode for layer MTP3 and up
- Check-pointing APIs for ISUP
  - TCAP, SCCP, MTP3, TUP automatic

# Redundancy Features and Benefits

- **Carrier-grade reliability (survival)**
  - **Against link failures**
  - **Against signaling board failures**
  - **Against server failures**
- **Manageability**
  - **Increase circuit capacity without service outage**
  - **Upgrade server hardware or software without service outage**
- **Scalability**
  - **Board-based SS7 processing to minimize host load**
  - **Multiple links provide signal load distribution**
- **Higher availability in the network**

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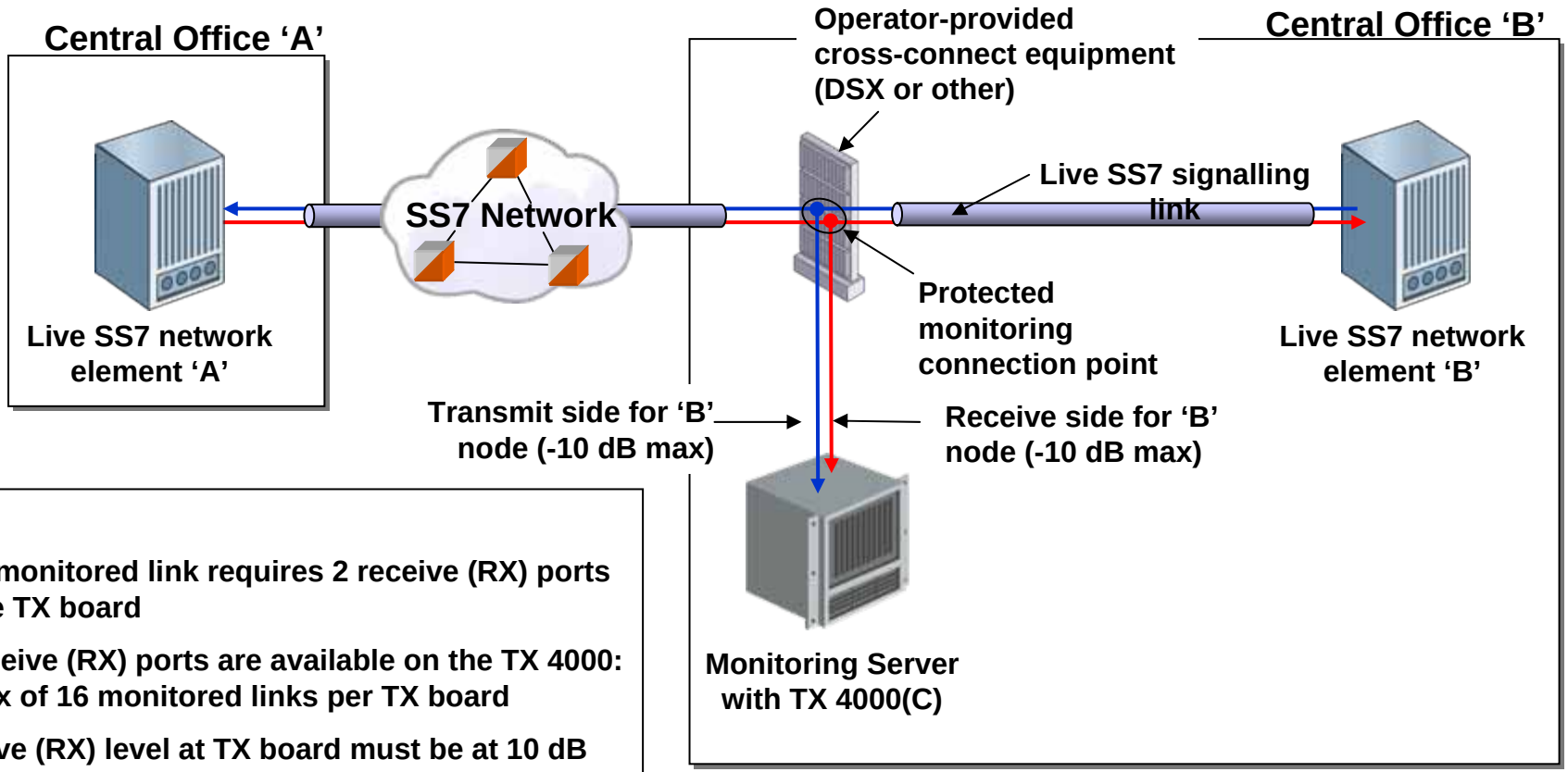
# SS7 Passive Monitoring Feature

- **Set of APIs and tools used in conjunction with a TX board to monitor up to 16 live SS7 signalling links**
- **Typical applications**
  - **Testing**
  - **Lawful intercept**
  - **Customized SMS messages (international roaming greetings)**
- **Filters**
  - **MTP2 signal units and headers can be filtered to massively reduce host load**
  - **Higher lever protocol layers such as ISUP and SCCP messages (based on DPC*, OPC* and/or SIO* fields)**
- **Message collection and buffering to limit host interrupts**
- **Not supported**
  - **Injection of messages**
  - **Dual mode (monitoring and SS7 signaling simultaneously)**

* **DPC: Destination Point Code**
**OPC: Originating Point Code**
**SIO: Service Indication Octet**

# SS7 Monitoring — High-Level Architecture




**Notes**

- Each monitored link requires 2 receive (RX) ports on the TX board
- 32 receive (RX) ports are available on the TX 4000: → max of 16 monitored links per TX board
- Receive (RX) level at TX board must be at 10 dB loss or better (includes protection circuitry and cabling)

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# Globally Deployed

- **Example NMS customer deployment locations**
  - **Austria, Belgium, Croatia, Czech Republic, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Lithuania, Monaco, The Netherlands, Norway, Russia, Spain, Sweden, Switzerland, UK**
  - **Australia, Cambodia, China, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Singapore, South Africa, Sri Lanka, Taiwan, Thailand**
  - **Argentina, Brazil, Colombia, Haiti, Mexico, Surinam**
  - **Canada and the US**
- **Government approvals for protocols where obtainable**
  - **Chinese Ministry of Information Industry**
  - **Italian Ministry of Telecommunications**
- **Presence on six continents**
- **NMS has Tech Support in US, Hong Kong and Paris**

# Connected to Carrier-Grade Equipment...

- **Ericsson AXE-10, CME-20, CXE**
- **Nortel DMS100**
- **Lucent 5ESS**
- **Alcatel E-10, S1240**
- **Siemens EWSD**
- **Nokia DX200**
- **Motorola**
- **NEC**
- **Huawei**
- **Hyundai**
- **Interwave**

# ...With Many Wireline and Wireless Telecom Networks

- **Telecom operator deployment examples**
  - **AT&T, British Telecom, Deutsche Telekom**
  - **France Telecom, Omnicom, Telefonica, Capcom**
  - **Orange, NTT, Videotron, Japan Telecom, KDDI, KPN**
  - **Korea Telecom, Chung Hwa, SingTel, Jitong**
  - **Cedetel, Telemar, Telstra, Optus, Maxis, Belgacom**
  - **Telenor, KPN Telecom, Belgacom, Telia, Mobilecom**
  - **Swisscom, Doro Telefoni, Star Telecom**
- **Work with certification labs**
  - **AT&T TCAP certification**
  - **KTL Labs BT-NUP certification**
  - **Telcordia**

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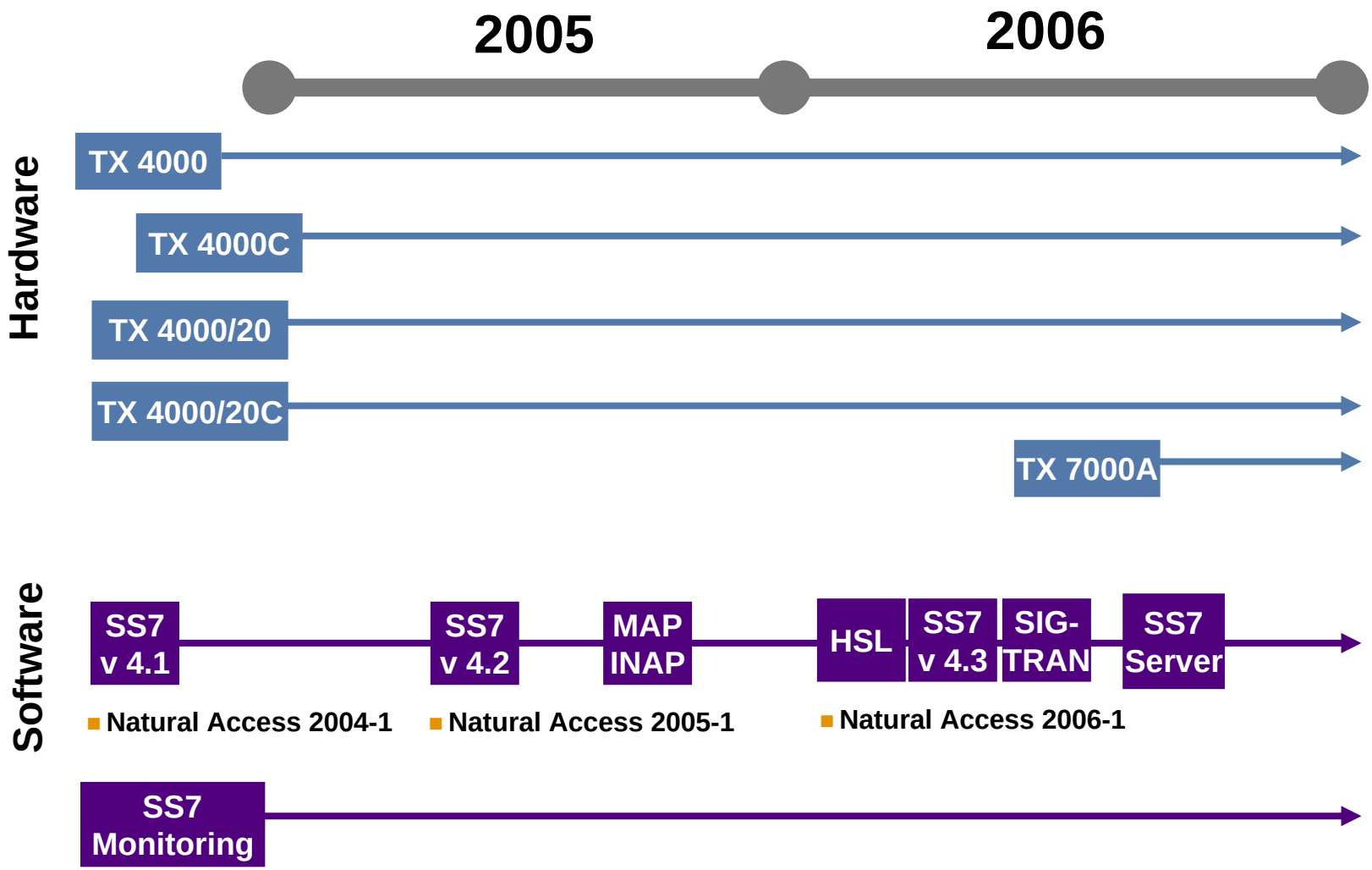
# SS7 Software and TX Series Roadmap



# High-Speed Links

- **High-capacity SS7 link**
  - **1.544 or 2.0 Mbps unchannelized T1/E1 links**
  - **n x 64 kbps links**
- **Runs on TX 4000**
- **Targeted Q106**

# SIGTRAN

- **Provides SS7 over IP transport for packet environments and softswitch or gateway connections**
- **IETF-compliant implementation of SCTP, SUA and M3UA layers**
- **Appropriate for range of network elements, including:**
  - **Media gateway controllers**
  - **IP-based SCPs**
  - **SIGTRAN gateways**
- **Targeted Q206**

# TX 7000A

- ATCA format SS7 interface board
  - Plugs into ATCA chassis
  - IPMI (Intelligent Platform Management Interface) support
- Full SS7 stack support
  - MTP, ISUP, TUP, SCCP, TCAP on board for integrated solutions
  - SIGTRAN support
    - Applicable to SS7 servers, signaling gateways
- Network IP control and management interface to application
  - Thin client on host
- Redundant board configuration for high availability
  - Checkpointing at MTP3, ISUP, TCAP
- Targeted Q206

# Competitive Differentiators

- **Integrated board, software from one company**
  - **SS7 integrated with Natural Access APIs**
- **Global Messaging Toolkit (ISUP)**
  - **Allows extension of ITU, ETSI, and ANSI standards**
- **Worldwide SS7 support organization**
  - **Rich set of application demo programs**
  - **SS7 expertise in North America, Europe, and Asia**
- **Competitively-priced, flexible licensing**
- **Results: reduced time-to-success in worldwide deployment and low cost of ownership**

# Be sure to check out these demos …

- **Mobile and IP Video Services**
  - **Powered by Open Access CG and TX boards**
- **Multimodal Messaging**
  - **Powered by Open Access CG and TX boards**

# Questions?

## Contact Info:

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