Motorola Simulcast

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System Configurations

- Analog
  - Conventional
  - Trunked
- Digital
  - Conventional
  - Trunked
  - Modulations
    - Wide Pulse
    - Linear
    - Narrow Pulse
- Mixed Mode

- Frequency Bands
  - High Band
  - UHF
  - UHF Shared TV
  - 800 MHz
  - 900 MHz
  - Low Band
    - Special Situations

Analog vs. Digital Equipment

ANALOG

- **Quantar Repeater**
- **DIGITAC Comparator**
- **TeNSr Channel Bank**
- **DSM II Card**
- **Rb Standard/GPS Receiver**

DIGITAL

- **Quantar Repeater**
- **ASTRO-TAC 3000 Comparator**
- **TeNSr Channel Bank**
- **SRU (data) Card**
- **Rb Standard/GPS Receiver**

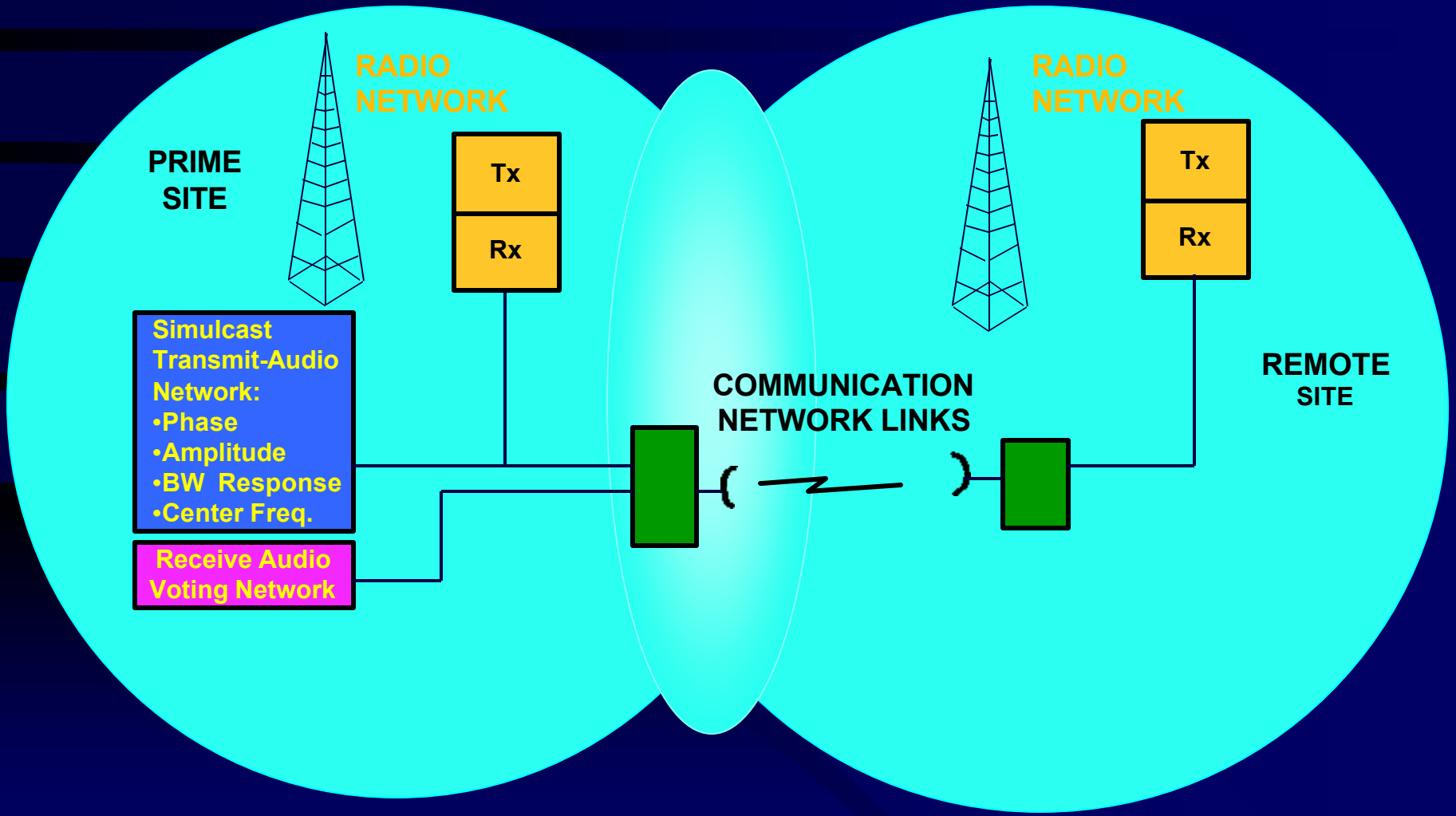
Why Simulcast?

- Wide Area Coverage
- Improved Channel Efficiency
- Increased In-Building Penetration
- Simple User Operation

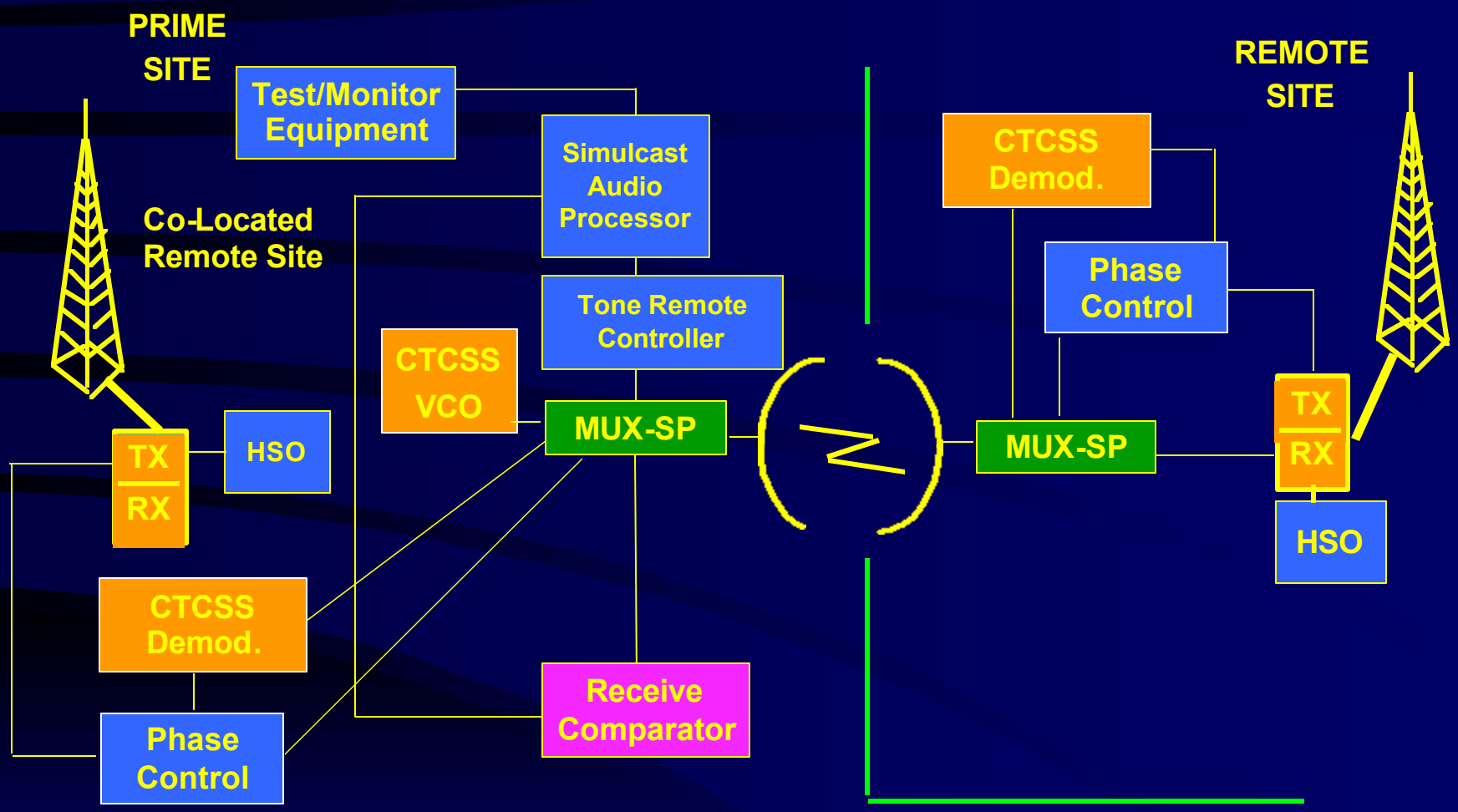
Why Motorola Simulcast?

- Clear Audio
- 4th Generation System Design
- Single Point Optimization
- The Clear Leader in Installed and Working Systems

Simulcast Components



Early Simulcast Technology



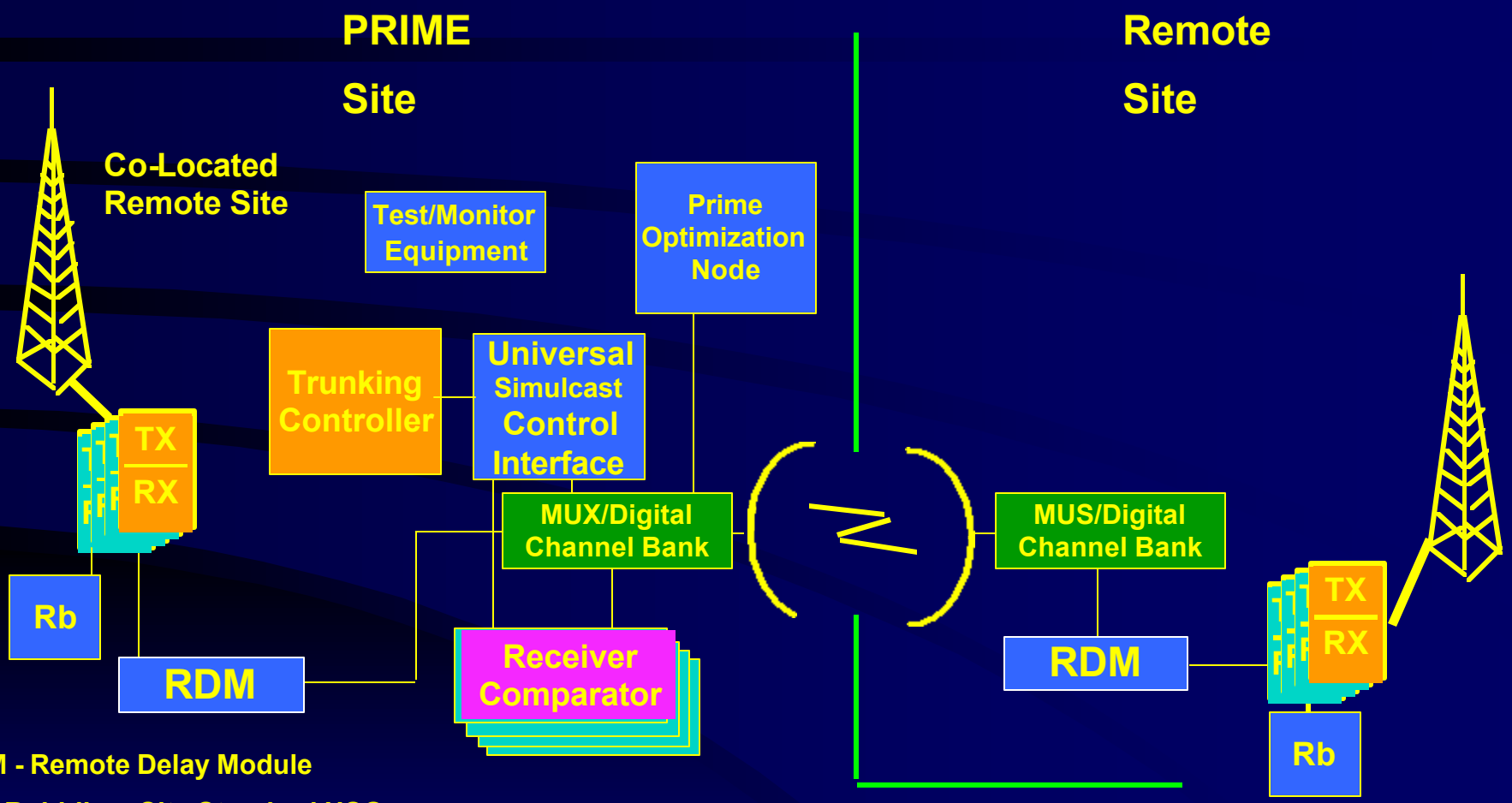
HSO - Hi-Stab-Osc.
CTCSS - PL
MUX-SP - MW Analog Multiplex

1975-1988 Technology, Generations 1 & 2

1st & 2nd Generation Simulcast Optimization Parameters

	Previous 1988 Technology
AMPLITUDE EQUALIZATION	**± 0.5 dB**
FREQUENCY EQUALIZATION	**± 1 Hz**
PHASE EQUALIZATION at 1000 Hz	**± 10°**

Previous Trunking Simulcast Technology



RDM - Remote Delay Module

Rb - Rubidium Site Standard HSO

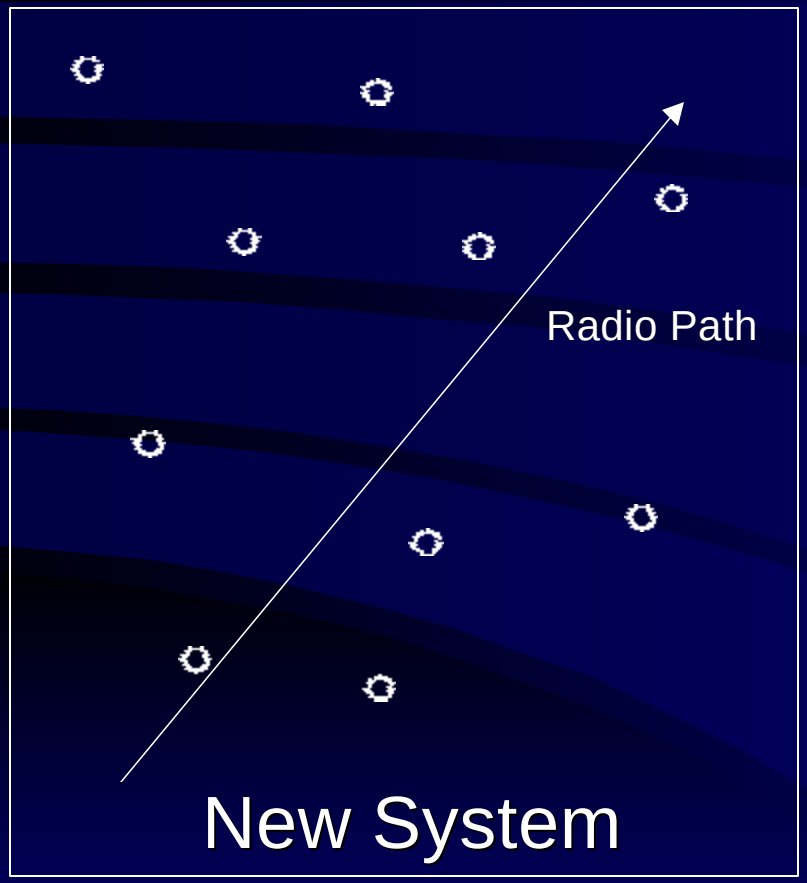
PON - Phase/Delay/Amplitude System

1988-1994 Technology, Generation 3

Simulcast Optimization Parameters

	Previous Technology	Today's Technology
AMPLITUDE EQUALIZATION	**± 0.5 dB**	**± 0.05 dB**
FREQUENCY EQUALIZATION	**± 1 Hz**	**± 0.004 Hz**
PHASE EQUALIZATION at 1000 Hz	**± 10°**	**± 1°**

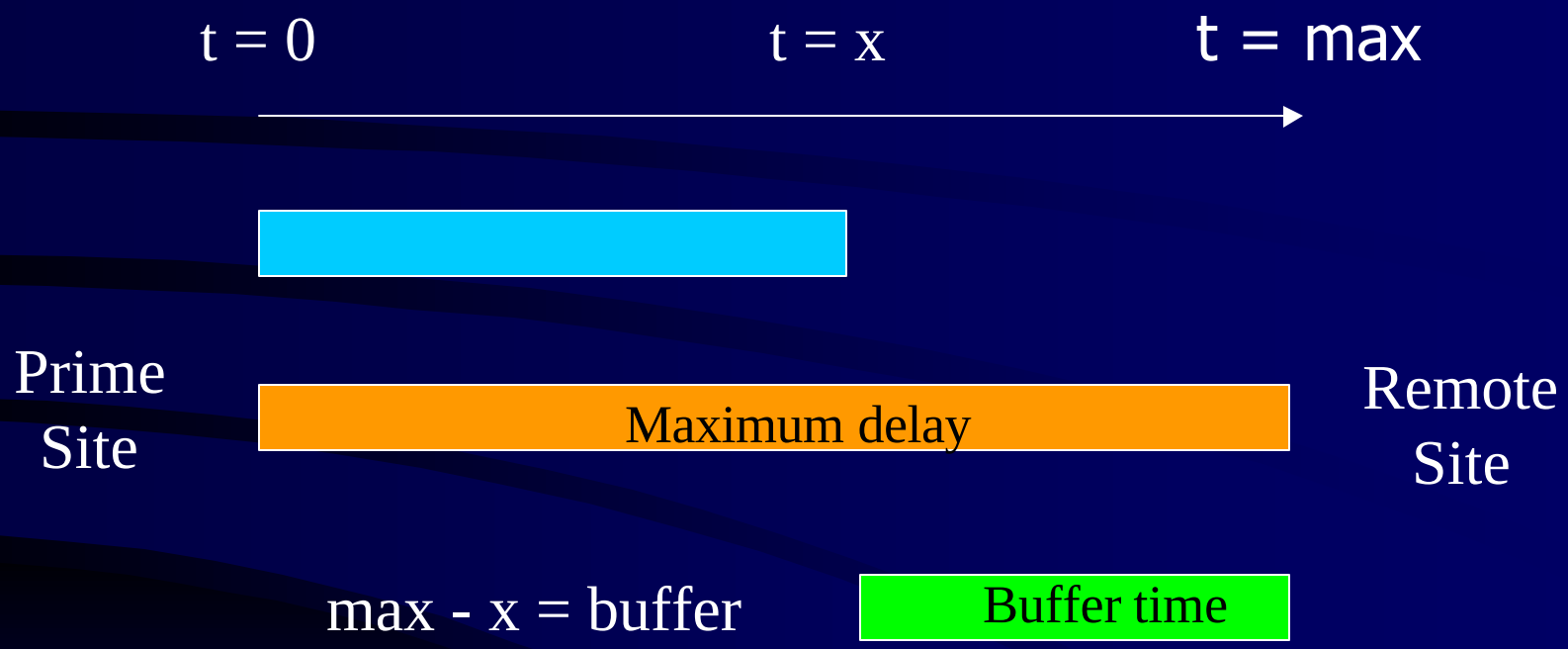
Specifications Make the Difference in Simulcast Overlap!!!!



"POPS" Similar to Single Site Multipath

Frequency and Duration of "POPS" Increase

GPS Time-Stamping

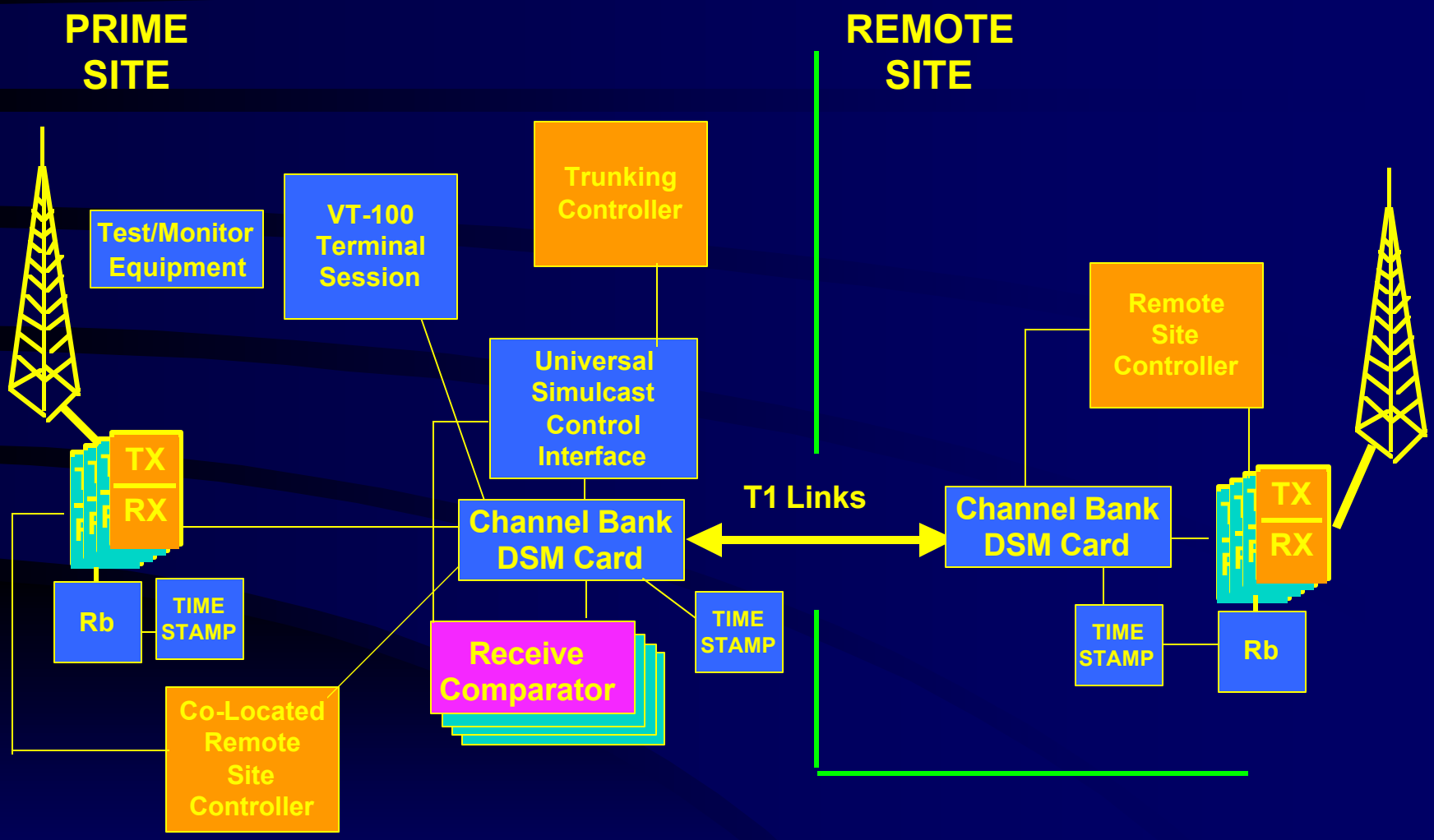


T1 Medium, DS0 Level

GPS Time Stamping Flexibility

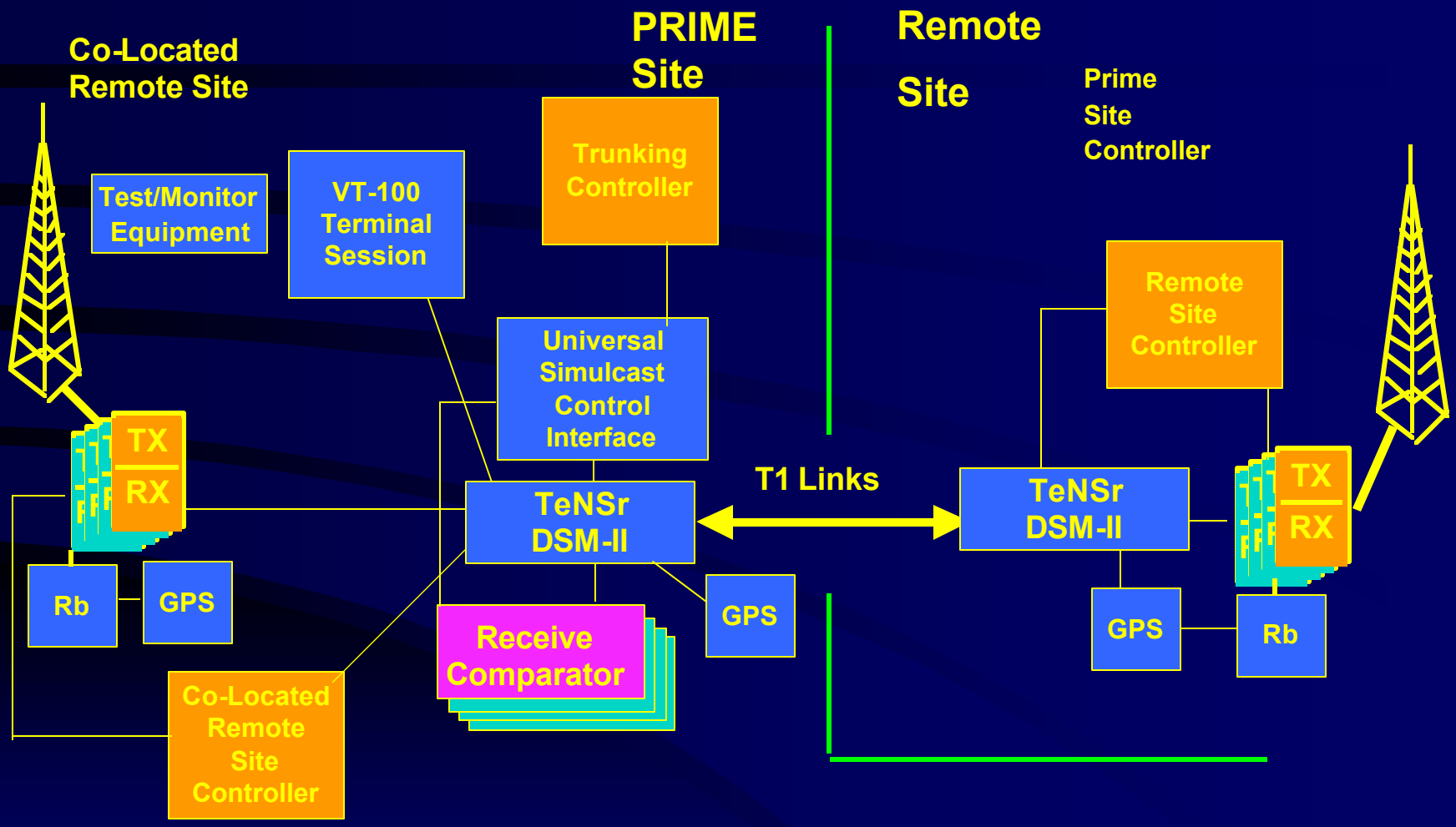
- Microwave Configurations
  - Star
  - Loop
- Network
  - Elastic Delay
    - Digital Cross Connection

Trunked Analog Simulcast Today



1995+ Technology

Trunked Analog Simulcast Today



1995+ Technology, Generation 4

Distribution Configurations

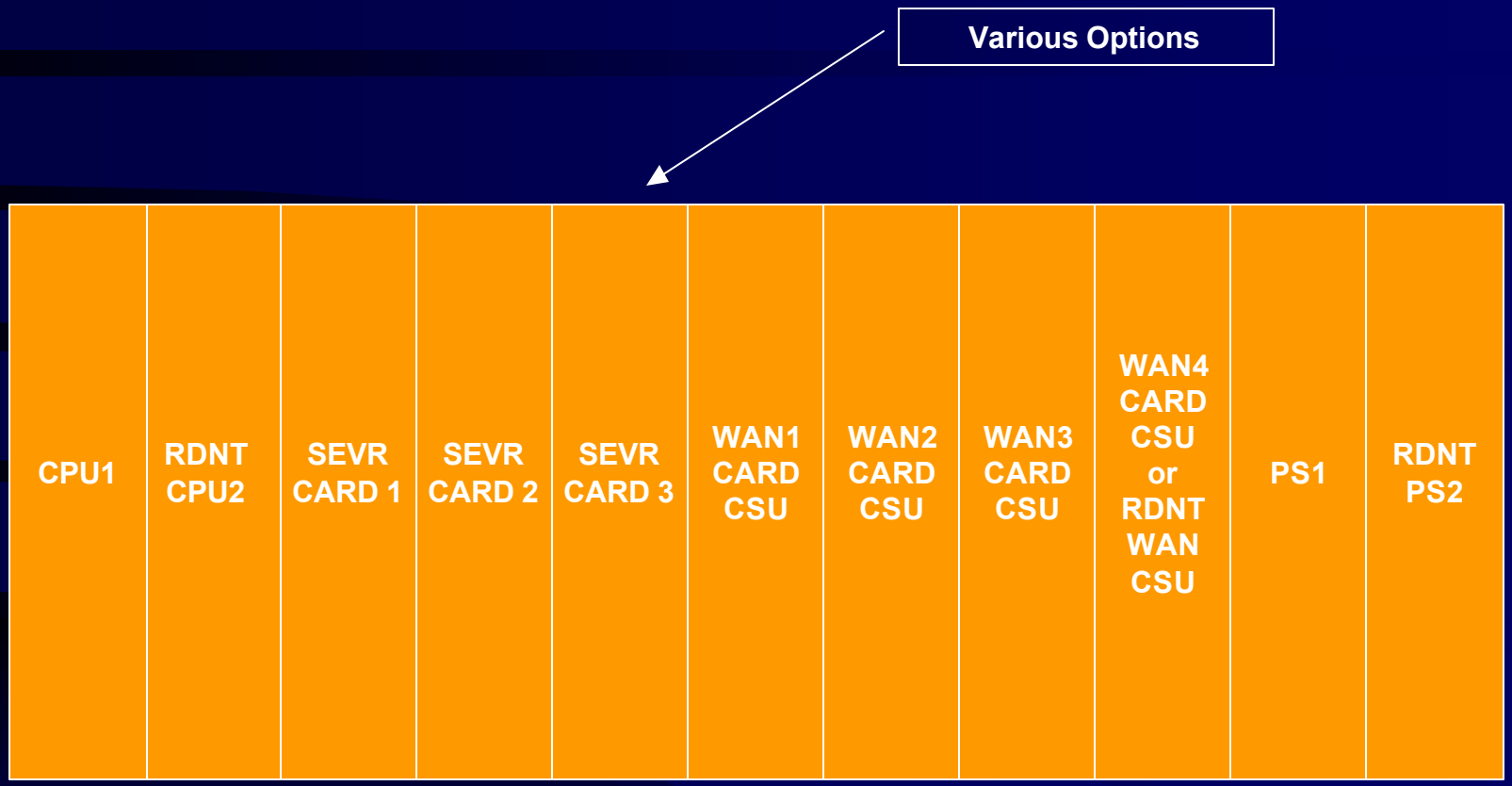
Audio

- Broadcast
  - Phase at each Site
- Non-broadcast
  - Phase at Central
- Extended Broadcast
  - > 14 Channels

Ports

- Prime
- Remote
- Slave
- Loop-back
- Slave loop-back

TeNSr Channel Bank

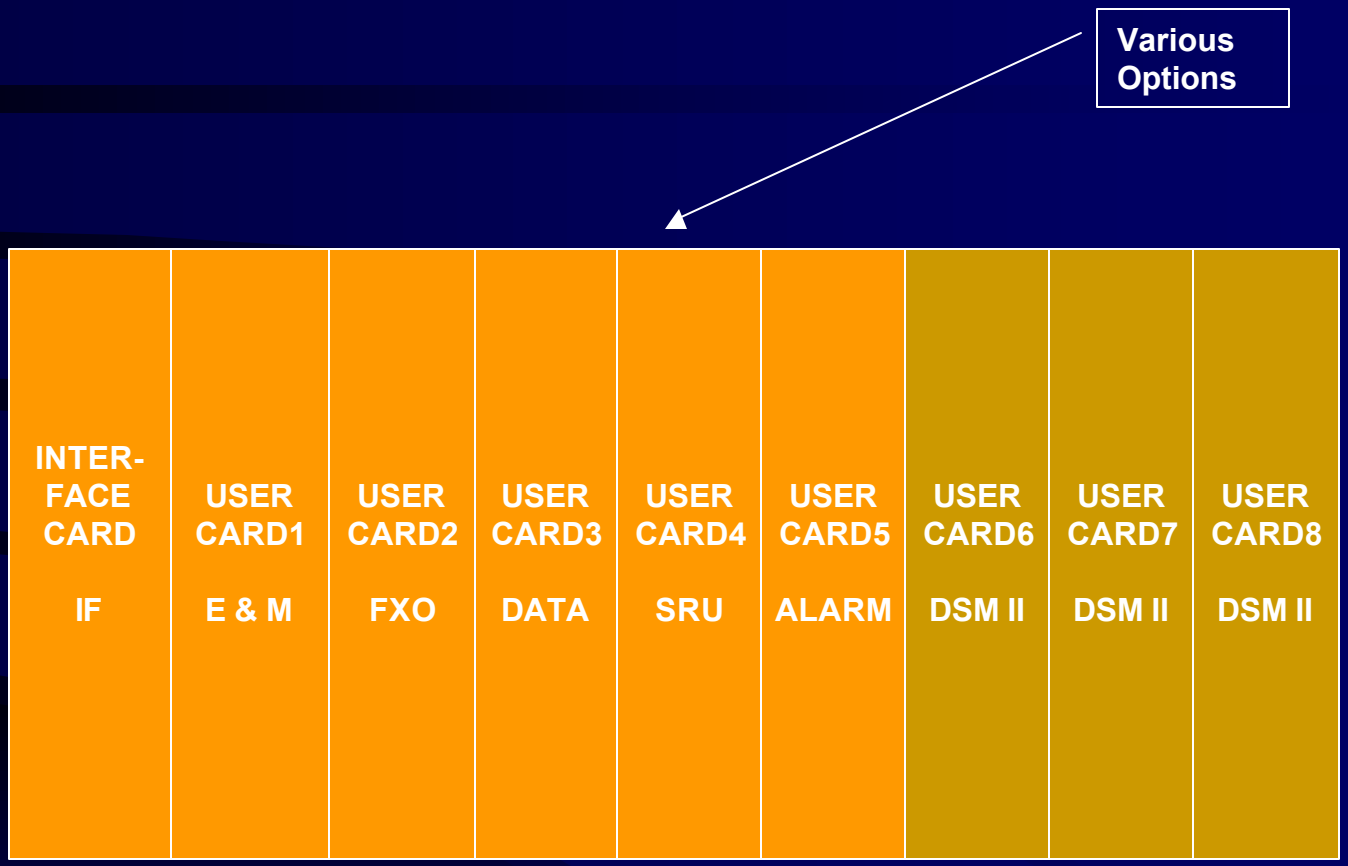


TENSR - 800 SERIES FRONT (Network) VIEW

DSM II

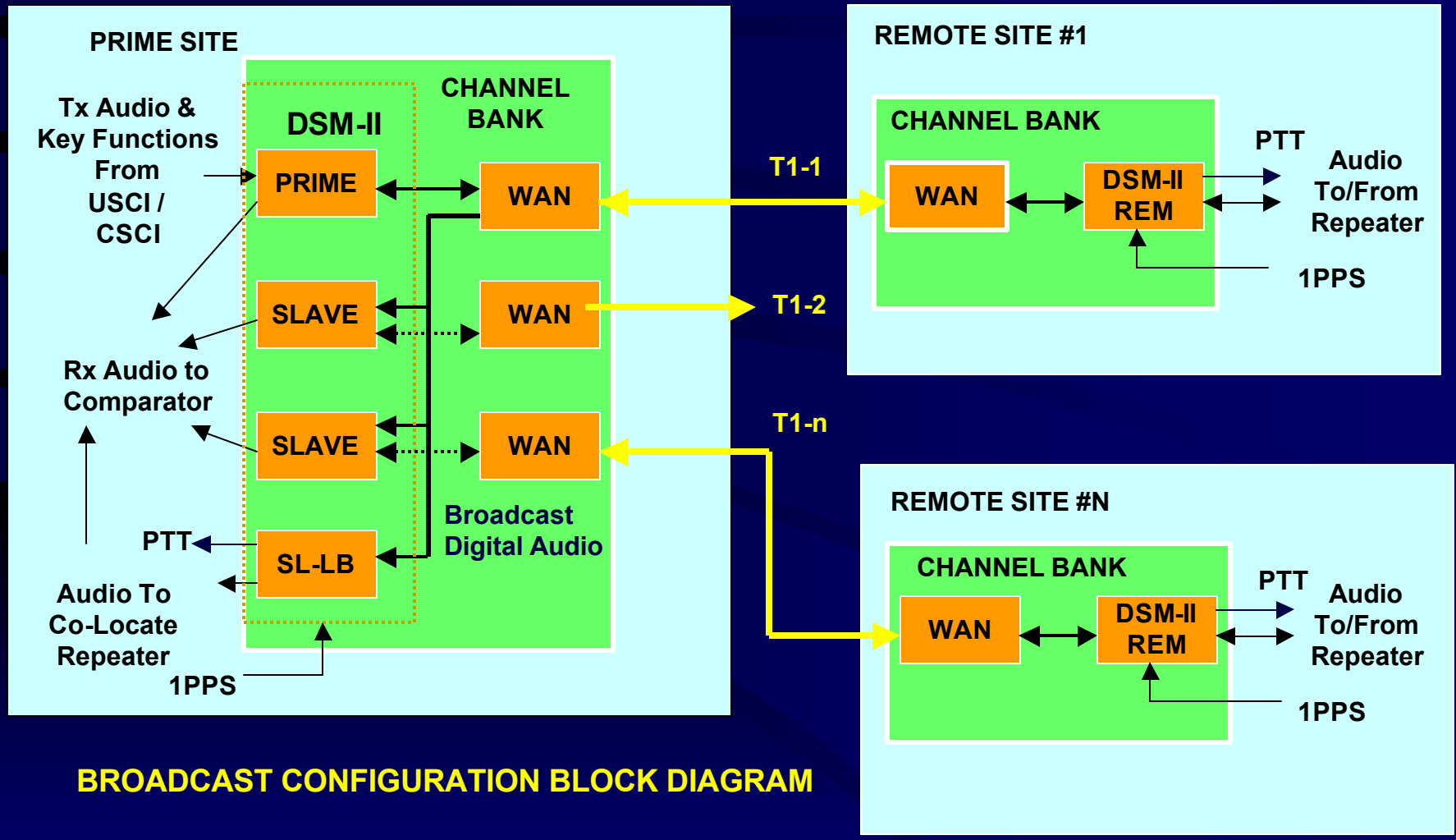
- Analog Audio
- 12 kbit data (DVP)
- Trunking
  - High Speed Data
  - Low Speed Data
- Conventional
  - PL / DPL
- 4 Duplex ports/module
- Signaling
- GPS 1ppS

TeNSr Channel Bank



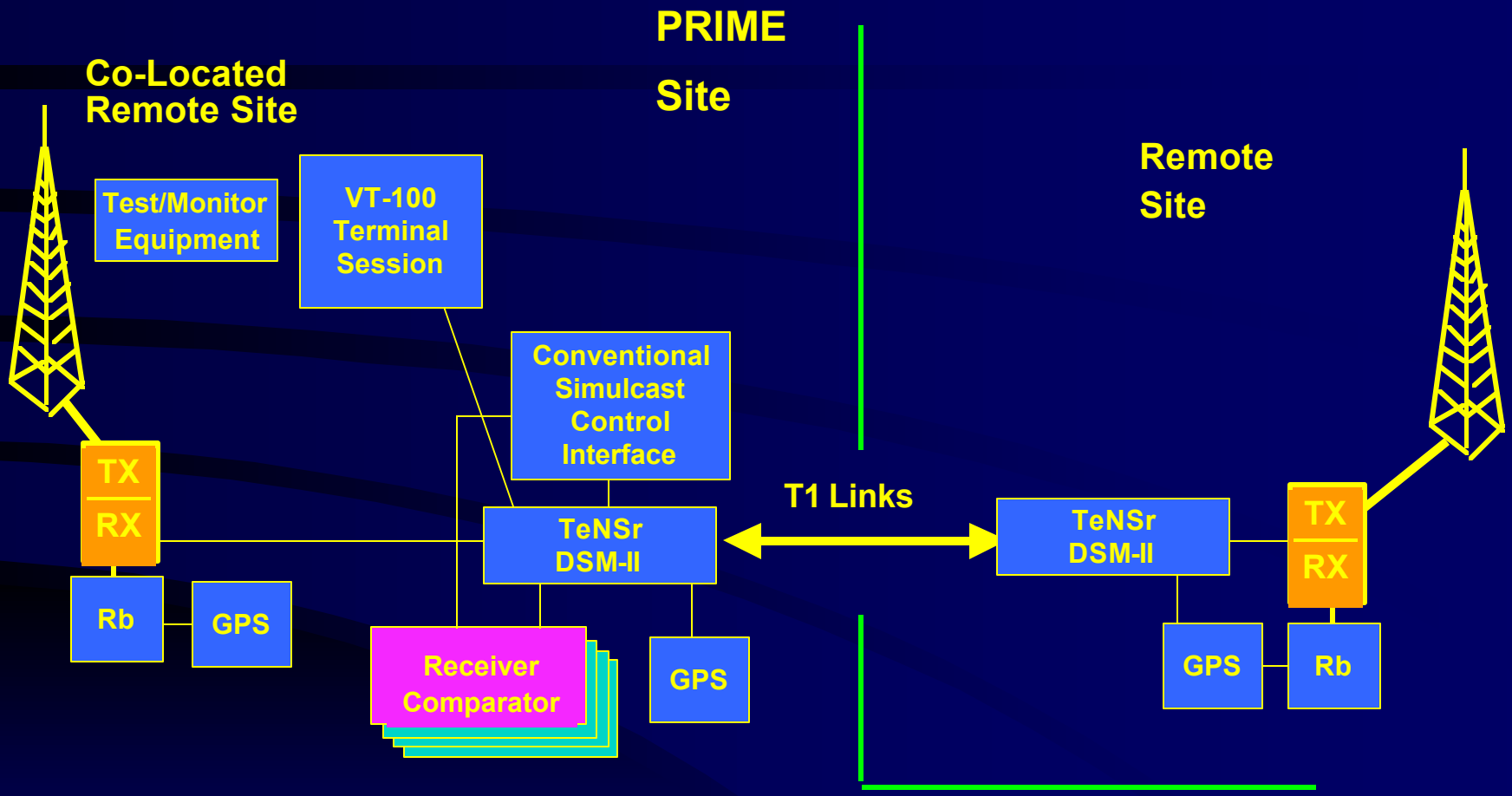
TENSR - 800 SERIES REAR (Site) VIEW

DSM-II T1 NETWORK CONFIGURATION



BROADCAST CONFIGURATION BLOCK DIAGRAM

Conventional Analog Simulcast Technology Today

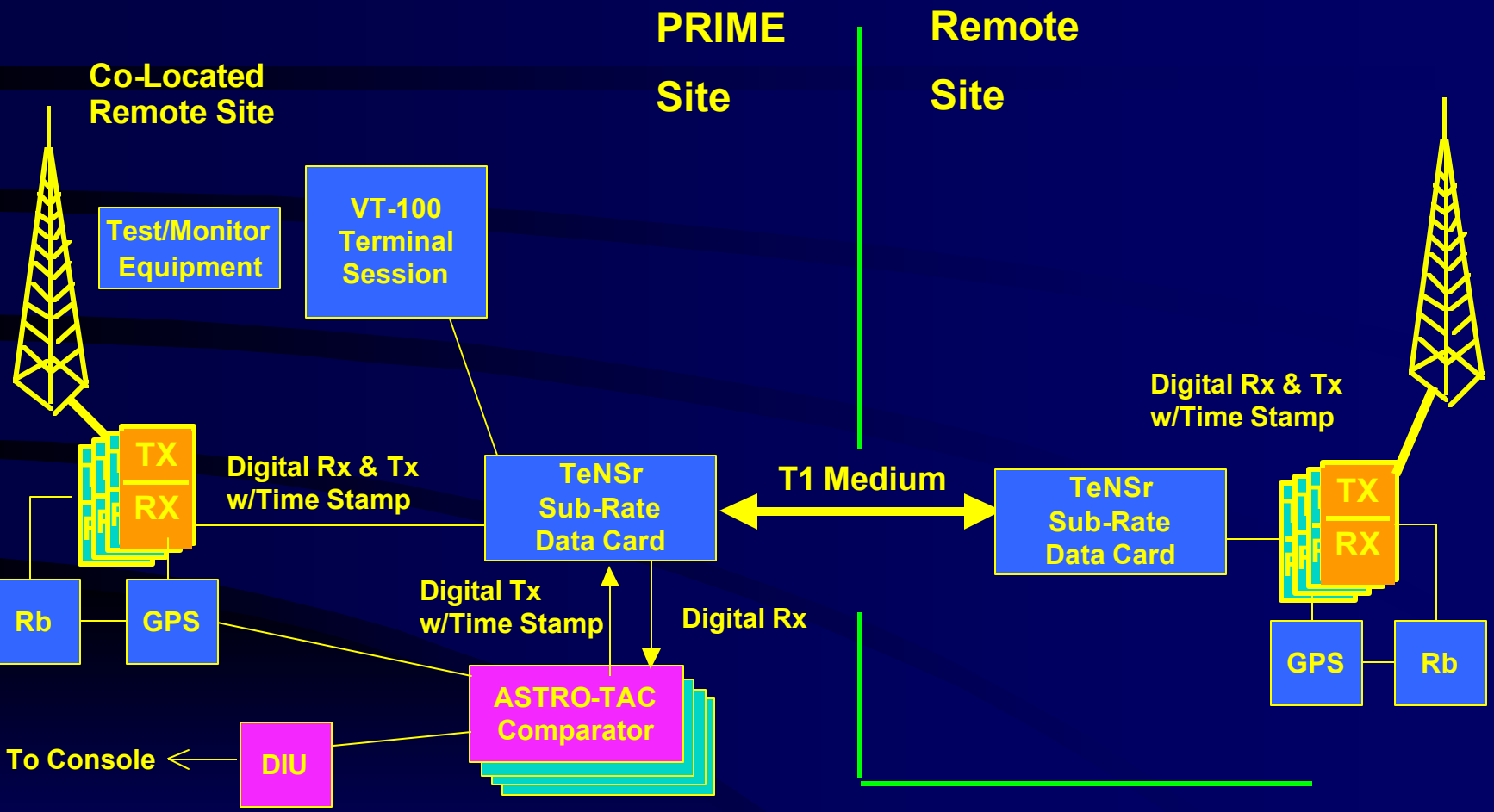


HSO - Hi Stab Osc. / Rubidium

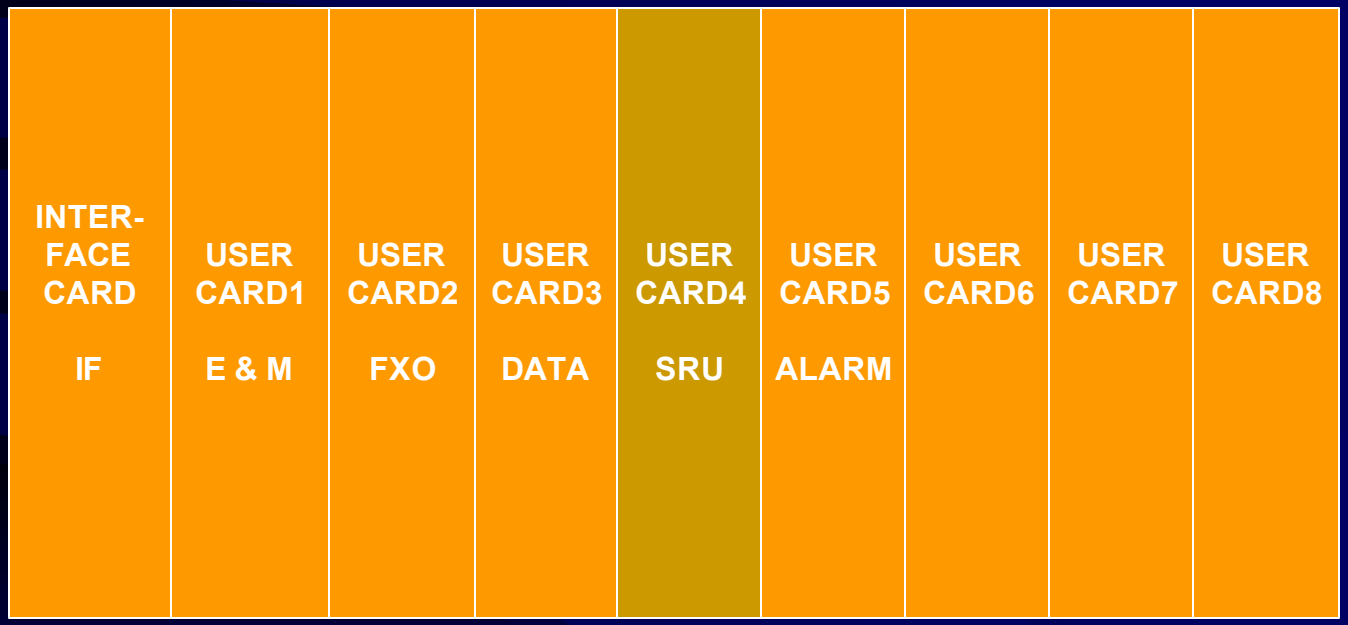
Time Stamp - Global Positioning Sat.

1995+ Technology

Digital Simulcast Today

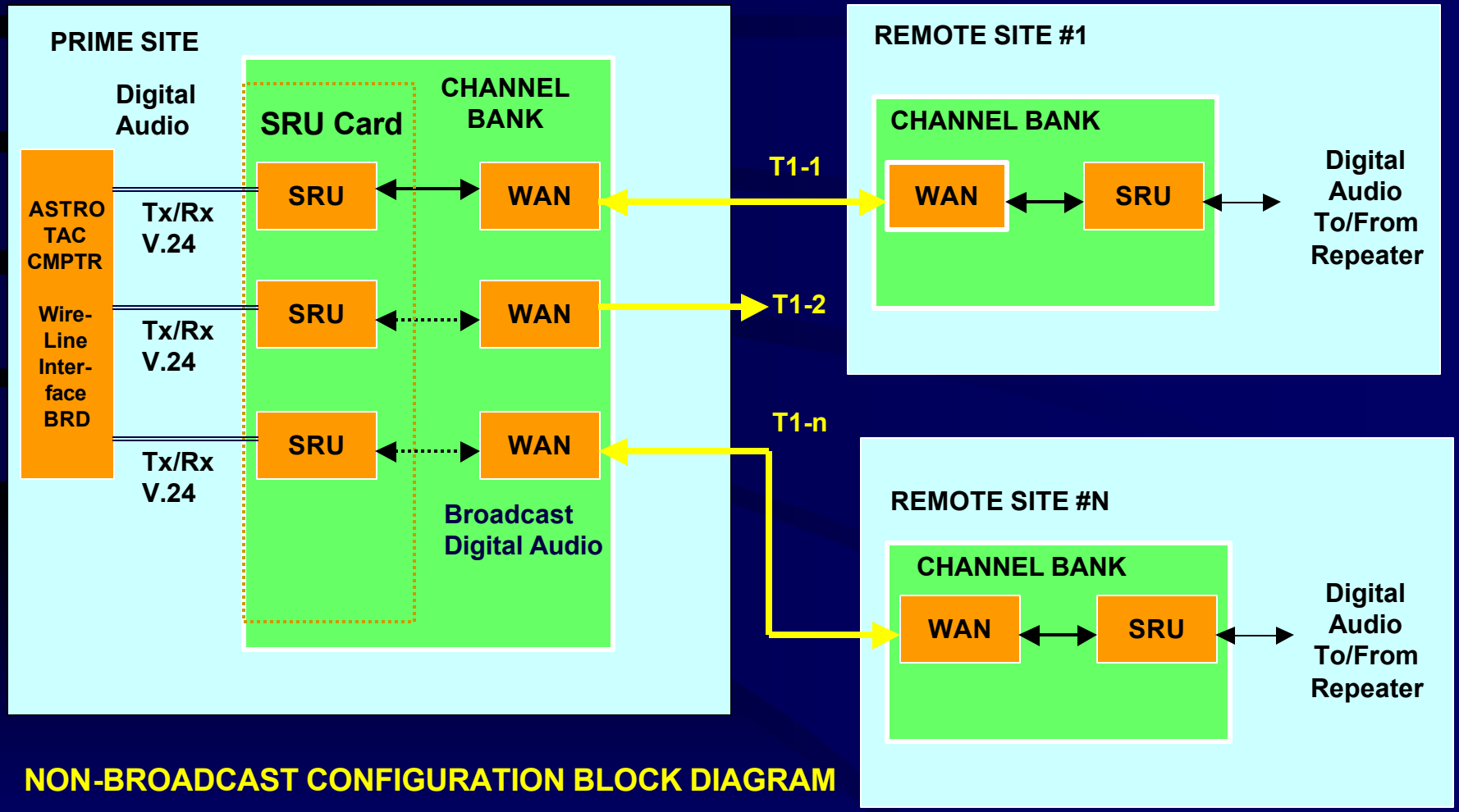


TeNSr Channel Bank



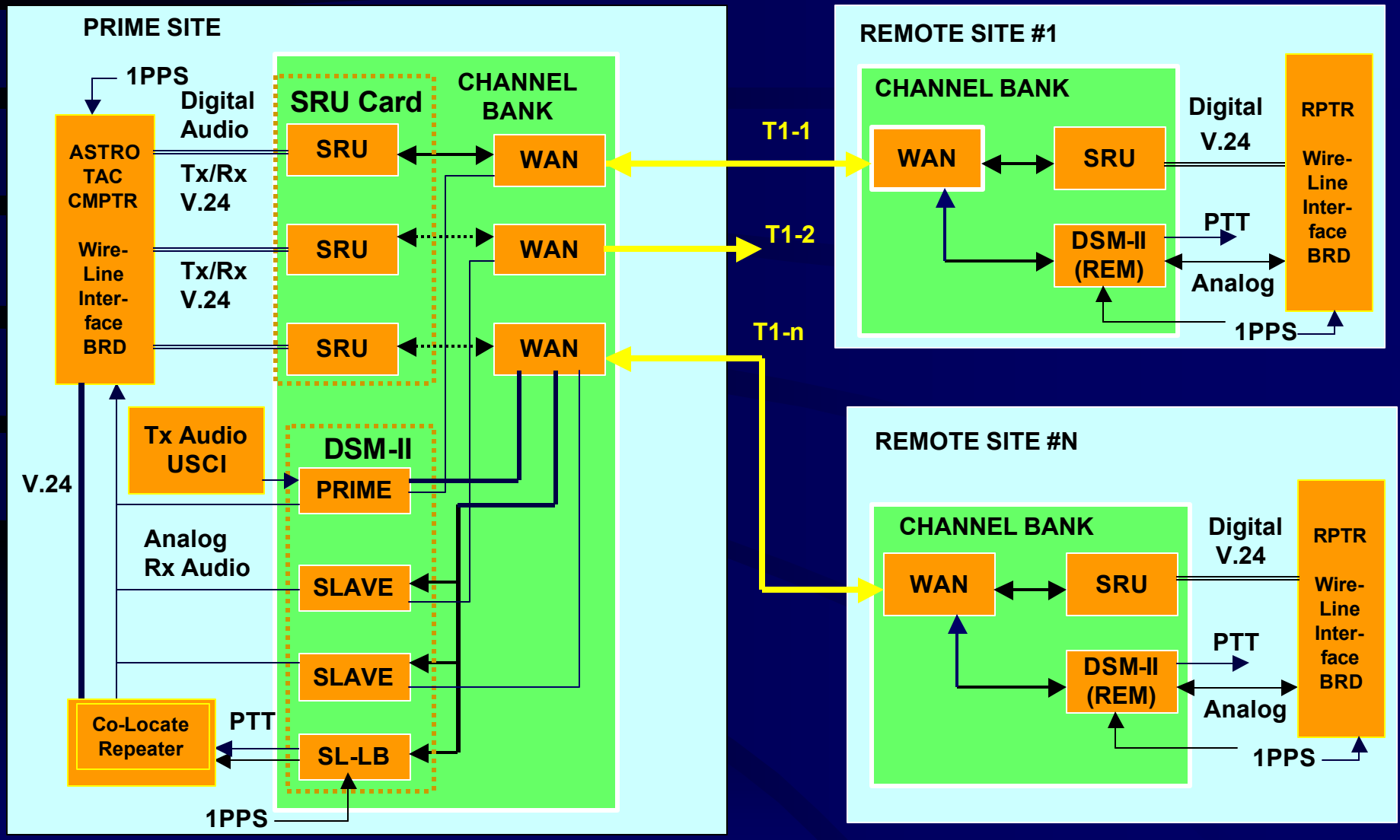
TENSR - 800 SERIES REAR (Site) VIEW

DIGITAL NETWORK CONFIGURATION



NON-BROADCAST CONFIGURATION BLOCK DIAGRAM

MIX-MODE NETWORK CONFIGURATION



Simulcast Site Separation

Wideband	Linear	Narrowband
• 25 kHz • ~ 21 miles* • Analog & Digital	• 12.5 kHz • ~ 14 miles* • Digital Only	• 12.5 kHz • ~7 miles* • Analog & Digital • Digital recommended

*Dependant on system design

Motorola Simulcast

QUESTIONS?

Special Case

- Mixed Mode where analog microwave is required OR Siemens Channel Band
- Digital uses GPS for time phasing
- Analog uses PON for time phasing