Reinventing the
NETWORK
Broadband & Business Solutions Summit 2014
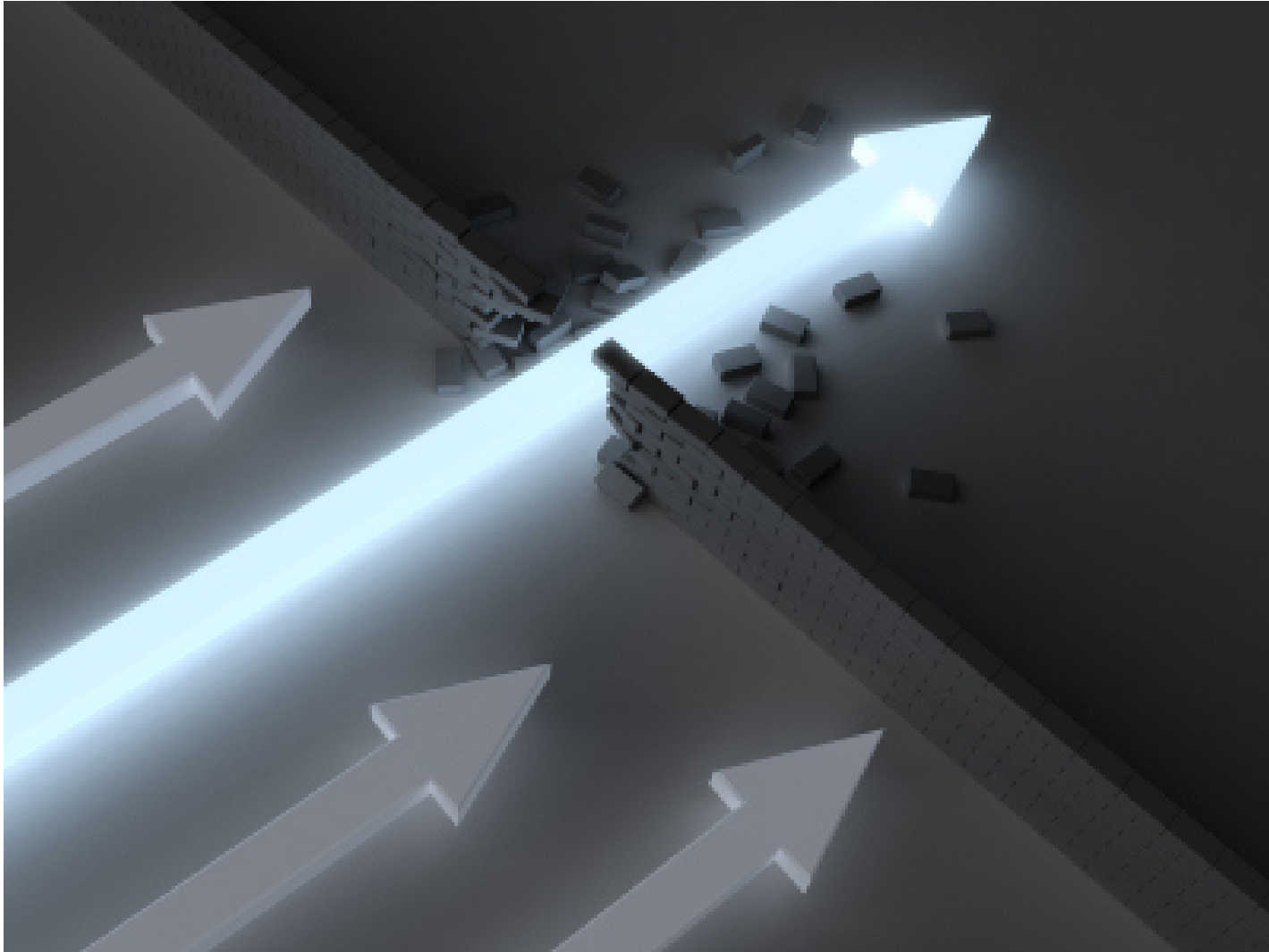
Switch Transformation and VoIP Solutions

Dean Bekken
Scott Miller
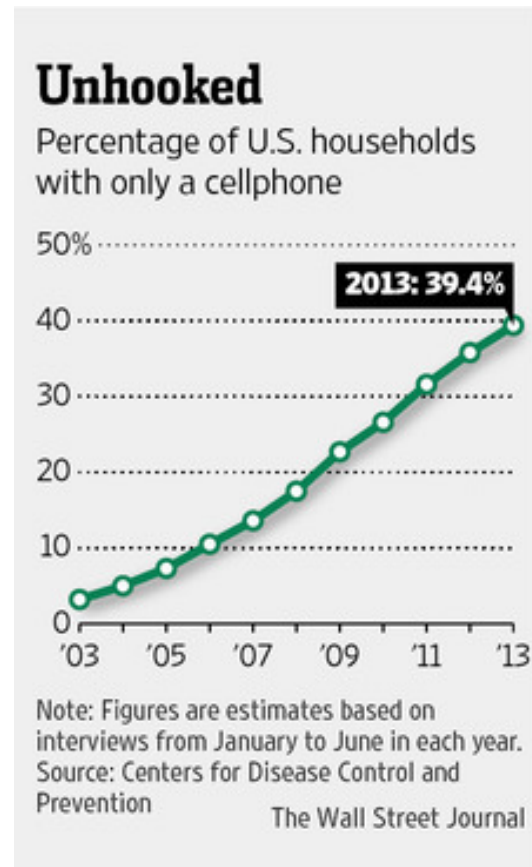
ADTRAN®

David Walsh – GENBAND CEO

ADTRAN

- POTS represents $90B+ annual revenue for US Carriers

- Operational Costs are becoming more significant

- Modernization must happen to remain relevant

- How can the carriers maintain the high quality voice offerings (*and associated revenue*) while modernizing their networks


He who owns the customer wins!

What of these are Concerns?

- Terrestrial voice-line attrition

- Opex on legacy Class 5 switches

- Competition from alternative providers

- Losing customers

- Aging infrastructure

- Retiring Class 5 knowledge base

- Power and Real Estate costs

- Regulatory Requirements

- Return on Investment

Unhooked

Percentage of U.S. households with only a cellphone

2013: 39.4%

Note: Figures are estimates based on interviews from January to June in each year. Source: Centers for Disease Control and Prevention

The Wall Street Journal

Is the POTS line going the way of the Pay Phone?

DB

- **<u>POTS Retirement</u>**:
  - Let the legacy POTS slowly disappear

- **<u>POTS Collapse</u>**:
  - Transition to VoIP at the switch

- **<u>Network Transformation</u>**:
  - Update the network while addressing POTS
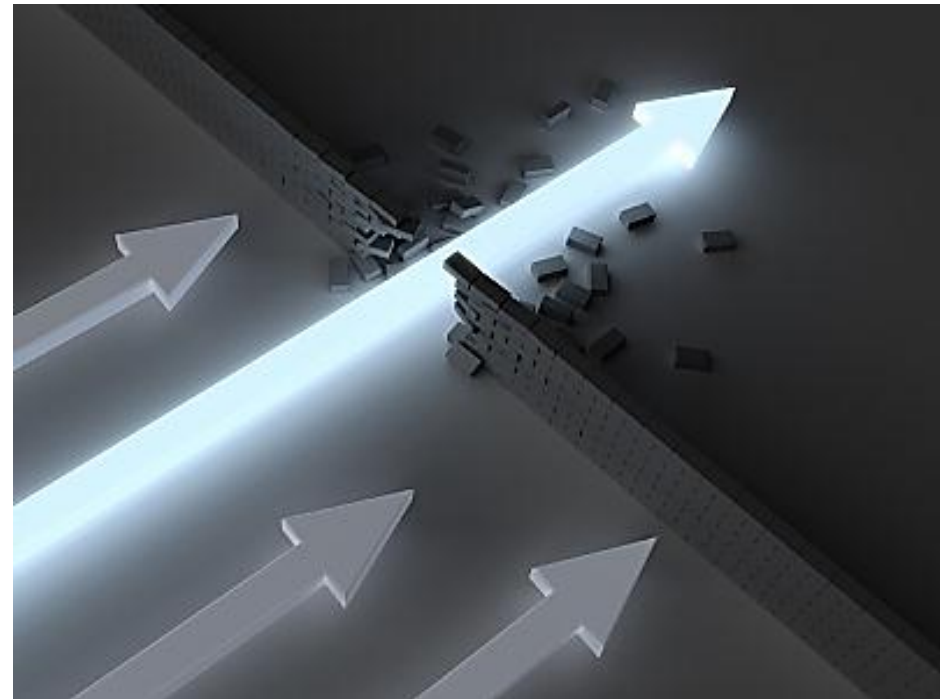
This is not about Switch Transformation
This is <u>NETWORK</u> transformation

More Fiber – New Photonics

Access System Capacity & Flexibility

Convergence of Access and Transport

Evolve … Change … Grow…

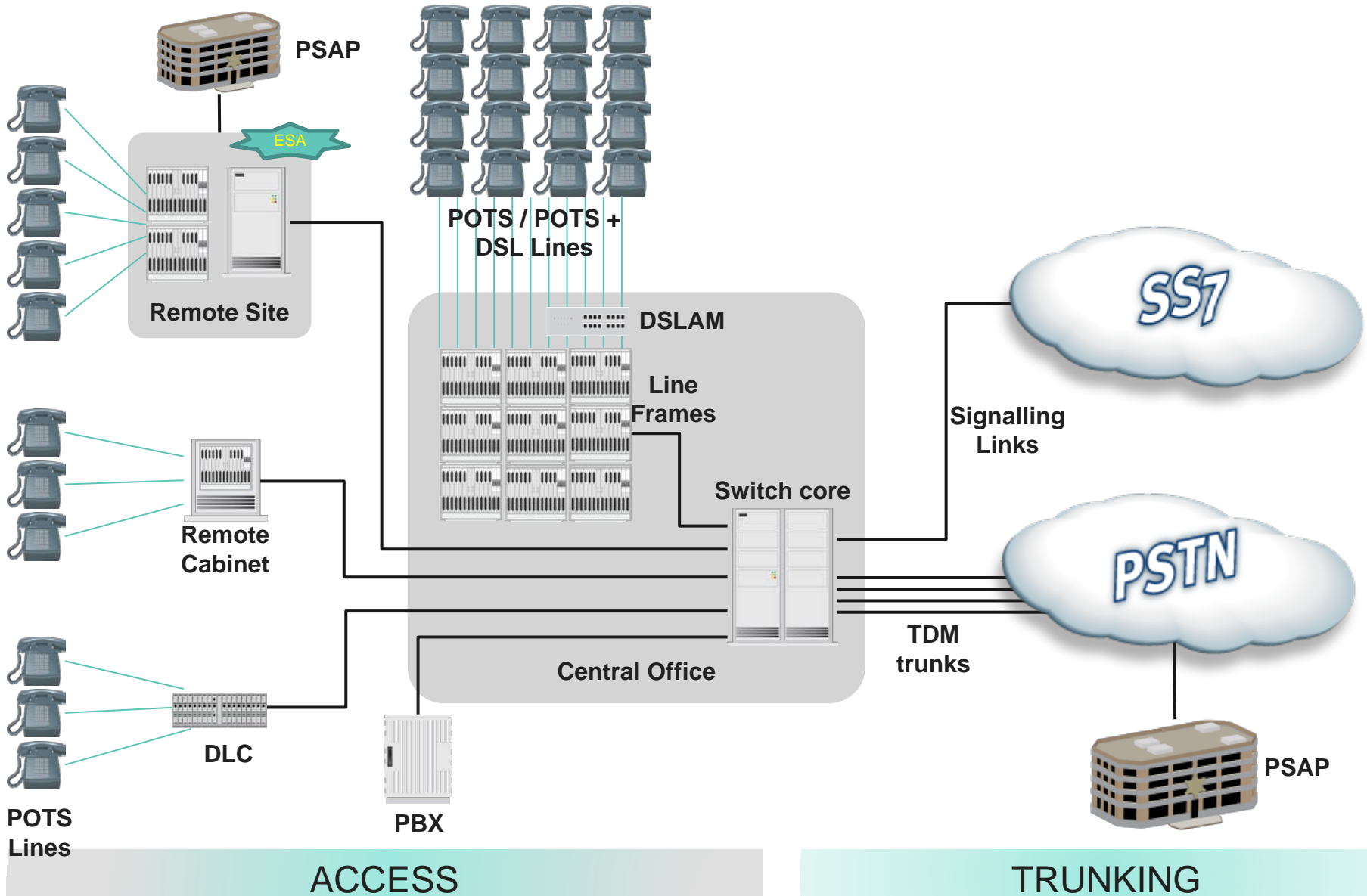# Must adapt the way we run our businesses

- Enhance the network
  - Speed/Capacity – sure
  - New Operational Environments

- Recognize new ways to generate revenue
  - New Serving Areas
  - New Solutions

- Optimize our organizations to match the new business models
  - Software Defined Network / Cloud
  - New Back-office Systems

- Straight up Line Bay replacement with POTS only option

- Line Bay Upgrade w/ POTS and HSI option

- HSI – ATA at the customer Prem

- FTTH - ATA at the customer Prem

- Wireless - ATA at the customer Prem

- Wireless – Cellphone Only – No POTS line
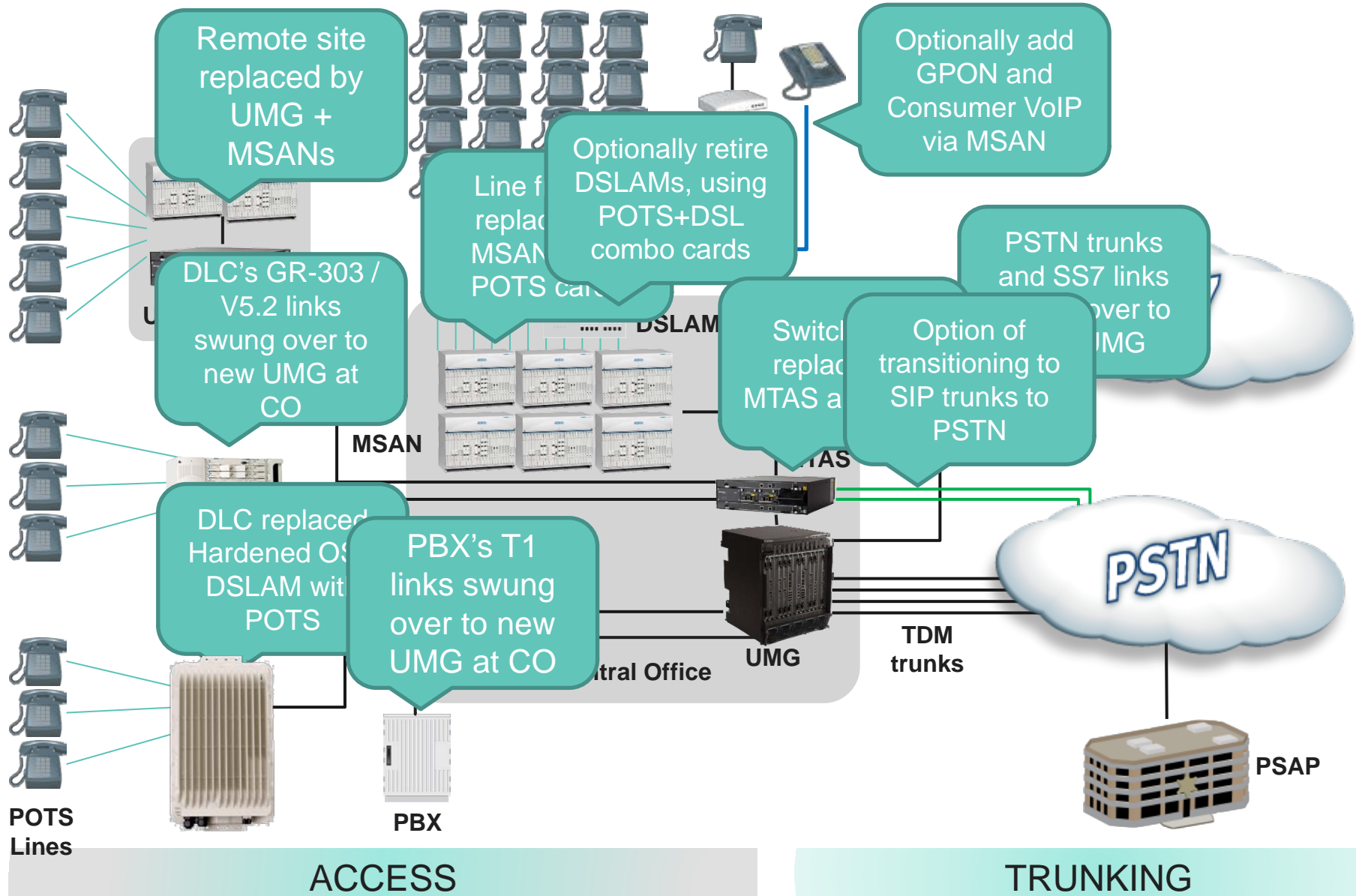
- *Are there others?*

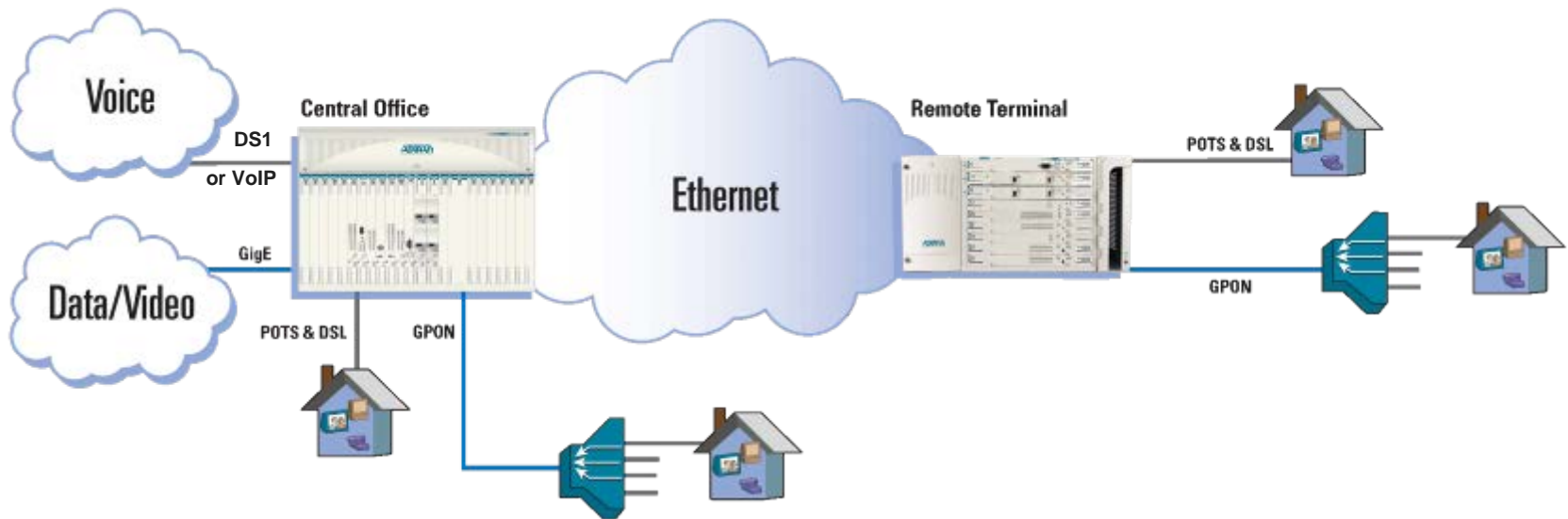**Wireless (3G/4G) Offerings**
- "There isn't enough wireless spectrum available to satisfy the data demands for consumers. We have tried it and it doesn't work" **Kyle Malady** (Verizon VP of Network and Technology)
- 85% of wireless data usage is consumed either in the home or in the workplace. Get the bits out of the air. (**Clive Selley,** *CEO, Service & Operations & Group CIO,* BT Technology)

PSAP

ESA

Remote Site

POTS / POTS + DSL Lines

DSLAM

Line Frames

Switch core

Remote Cabinet

Signalling Links

SS7

PSTN

TDM trunks

DLC

Central Office

PBX

PSAP

POTS Lines

ACCESS

TRUNKING

Transformed network ADTRAN/MetaSwitch

Remote site replaced by UMG + MSANs

Optionally retire DSLAMs, using POTS+DSL combo cards

Optionally add GPON and Consumer VoIP via MSAN

Line f... replac... MSAN... POTS car...

PSTN trunks and SS7 links ...over to ...MG

DLC's GR-303 / V5.2 links swung over to new UMG at CO

Switch... replac... MTAS a...

Option of transitioning to SIP trunks to PSTN

DLC replaced... Hardened OS... DSLAM wit... POTS

PBX's T1 links swung over to new UMG at CO

DSLAM

MSAN

...TAS

...tral Office

UMG

TDM trunks

PSTN

PSAP

POTS Lines

PBX

ACCESS

TRUNKING

- Interface to traditional TDM or newer VOIP networks
  - POTS traffic converted to VoIP on the line card
  - No "wasted" bandwidth
  - Network based VoIP

- Mature VoIP/SIP stack as part of solution
  - SIP and MGCP support today

- Leverage existing MDU wiring
  - Reduce capital expense
  - Minimize construction and headache
  - Pass more customers with existing workforce

- Utilize VDSL2 & G.fast (vectoring/bonding)
  - 200Mbs service @ 1800ft with VDSL2
  - 700Mbs service @ 100m with G.fast per pair

- Enable success based transition to full FTTP
  - Same architecture as residential GPON
  - Push fiber when the business case allows
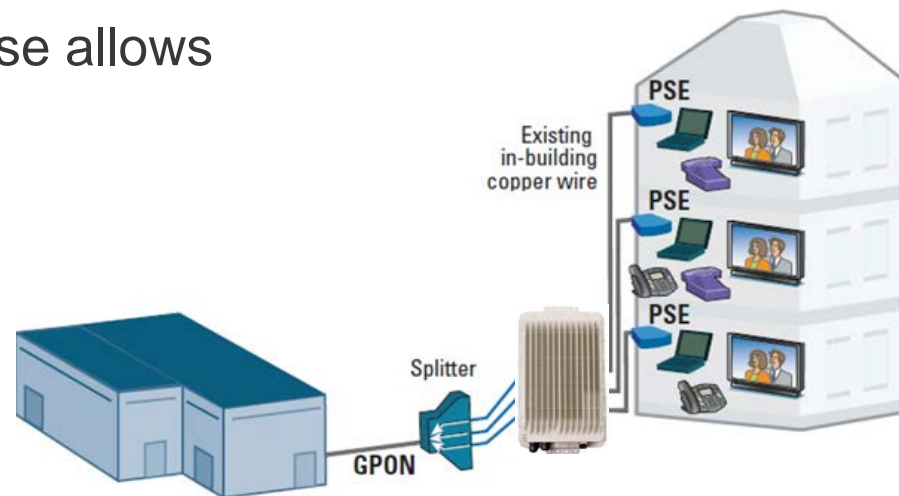
- DS1 Voice Gateway 32-Port Line Module
  - Packet voice to TDM gateway
  - Dynamic call set-up and tear-down
  - GR-303 and TR008
  - Pseudowire Emulation Edge to Edge (PWE3)
  - Optionally redundant

- Telcordia Certified
  - Full CLASS support
  - Deployed with many legacy CL5 switches and NG Soft Switches

- GR-303 Scalability
  - 2,048 CRVs per IG
  - 3 IGs per Voice gateway
  - Up to 9 IGs per COT

CPOTS Voice Module

- CPOTS 24-Port Line Module
  - Packet voice to TDM gateway
  - Dynamic call set-up and tear-down
  - TR-57 Applications
  - Non-Redundant
  - Max of 504 FXO Lines per System

- Full CLASS support

- Flexible deployment model (Node 1 and Node X)

- Wide Range of Switch options
  - DMS10
  - DMS100
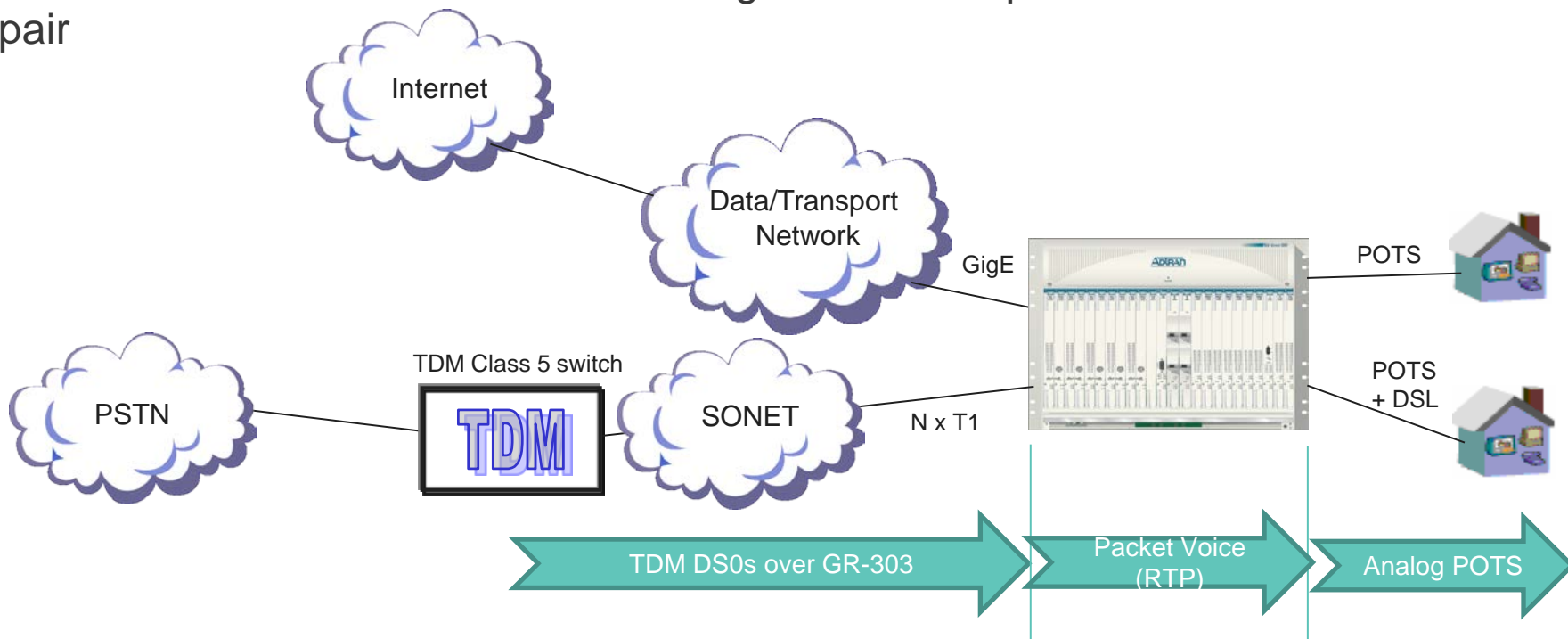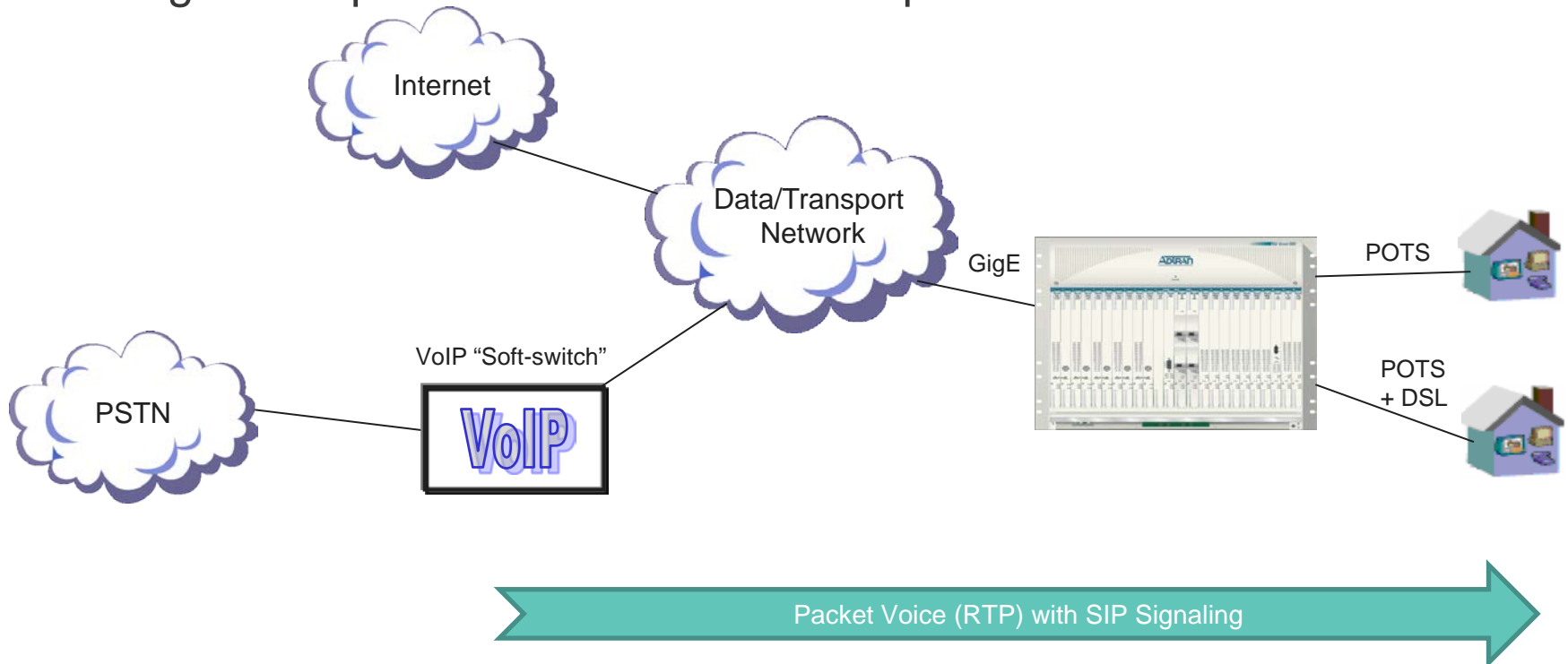 - 5ESS
  - EWSD
  - C20
  - C15
  - DCO

# Total Access 5000

Line Gateway Solutions

- PSTN connected to Class 5 Switch

- Class 5 Switch connected to the Voice Gateway in the TA5000 through either:
  - T1 Based GR-303
  - T1 Based TR-008

- Voice Gateway "digitizes" POTS (makes VoIP) for transport over the backplane or across Ethernet network.

- Access Module converts VoIP to Analog POTS to be provided on the customer pair

Internet

Data/Transport
Network

GigE

POTS

TDM Class 5 switch

PSTN

TDM

SONET

N x T1

POTS
+ DSL

TDM DS0s over GR-303

Packet Voice
(RTP)

Analog POTS

SIP Architectural Overview

- PSTN connected to VoIP Switch

- VoIP Switch connected to the TA5000 through an Ethernet transport network

- VoIP over Ethernet terminated by POTS or COMBO Access Module

- Analog POTS provided on the customer pair

Internet

Data/Transport Network

GigE

POTS

VoIP "Soft-switch"

VoIP

PSTN

POTS + DSL

Packet Voice (RTP) with SIP Signaling

Voice Over IP Architecture

- **Line Gateway Replacement**
  - SIP signaling to the Soft Switch
  - 504 ports of POTS via 24-port COMBO or RPOTS
    - 1008 ports of POTS with new 48-port RPOTS under development
  - VDSL2 and ADSL2 combo options

- SIP Interoperability with:
  - GENBAND
  - Broadsoft Broadworks
  - MetaSwitch VP3500/3510,
  - Sylantro Applications server,
  - Taqua
  - Asterisk
  - Cisco AS5000 Series, MGX8800 Series
  - Lucent Compact (Telica),
  - Nortel MCS5200, Packet Voice Gateway, RDT-8g, Nortel CS2000
  - Huawei
  - Siemens SURPASS hiQ
  - SIP Express Router (ser)
  - Sonus GSX9000
  - Tekelec 3000 (VocalData), 9000 (SanteraOne)

VoIP Soft Switch

Packet Transport

ISP

N x 1G
N x 10G

Total Access 5000

Up to 1008 POTS
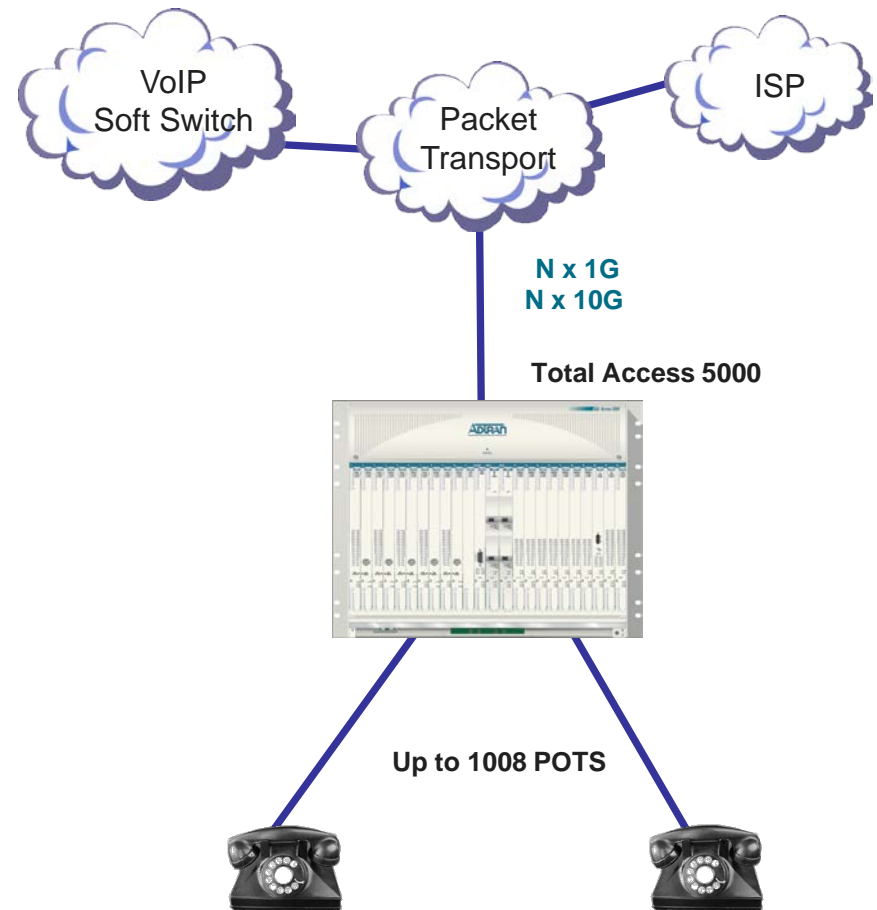
- RPOTS 24-Port Access Module
  - Loop and Ground start
  - 1850 Ohm (including handset)

- RPOTS 48-Port Access Module*
  - Loop and Ground start
  - 1850 ohm (including handset)

- COMBO ADSL2+ 24-Port Access Module
  - POTS, ADSL2+ and Splitter
  - Single slot—504 Ports per TA5000

- VDSL2 Combo 24-Port Access Module
  - POTS, VDLS2 and Splitter
  - 5-Band VDSL2 Capable
 - Single Slot—504 ports per TA5000
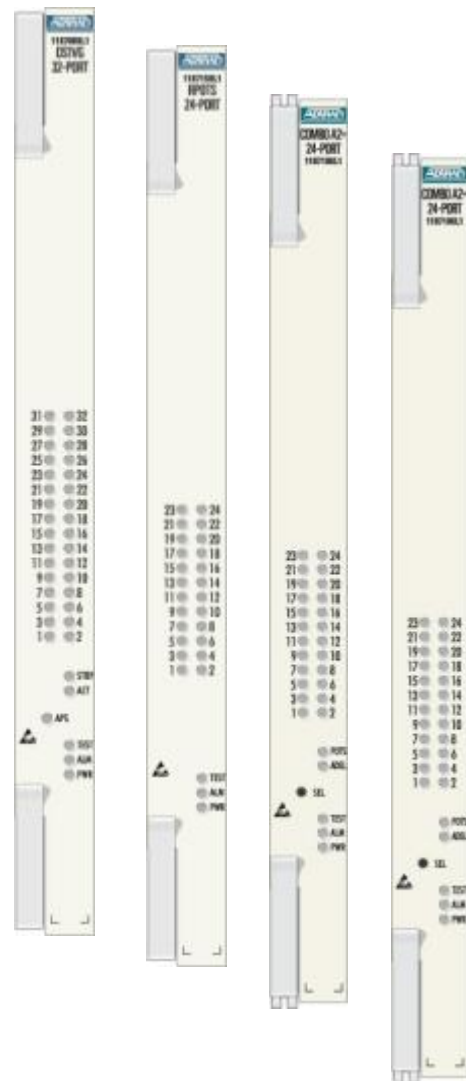
*In Development

- DS1 Voice Gateway 32-Port Line Module
  - Packet voice to TDM gateway
  - GR-303 or GR-008 (software selectable)
  - Optionally redundant

- 32 DS1s = 768 DS0s per Voice Gateway
  - Up to 28 DS1s per IG (672 DS0s)
  - Up to 3 GR-303 IGs per Module

- TDM Signaling
  - Up to 3 GR-303 Interface Groups (IGs) per Module
  - All 32 T1s available for TR-008 Mode I/II

- Only required if connecting to a TDM voice switch

- Up to 10 Sets of VGs per Chassis
  - 30 IGs per Chassis
  - 61,440 CRVs per Chassis

- Serves as a TMO—remember, all the access modules are VoIP capable from Day 1

- Compact remote node for overlay and combo applications
  - 192 ports overlay or 96 ports combo with VDSL2 system level vectoring

- Loop shortening
  - 100Mbps to 3500ft 24AWG with bonding and vectoring

- BBDLC
  - VDSL2+POTS combo for legacy DLC replacement and softswitch migration
  - SIP, MGCP, TDM voice gateway

- New Access Modules
  - Single-slot 48p VDSL2 overlay
  - Dual-slot 48p VDSL2 combo
  - Backwards compatible to ADSL2+
  - Any-port ATM and EFM bonding

- All Access Modules are supported in all TA5000 systems
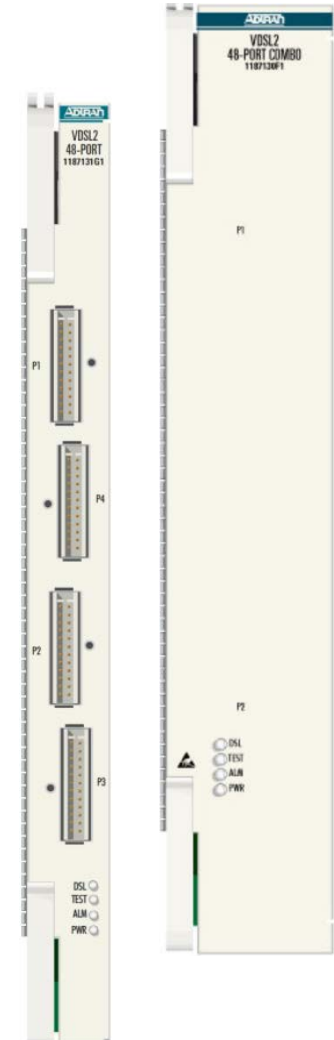
ADTRAN

- ADTRAN Line Access Gateway Solution
  - Proven solution in several carrier migrations
  - Reduces the costs of providing voice services
    - Real Estate
    - Power
    - Maintenance
  - Helps maintain existing work flows
    - Integration with legacy OSS
    - Integration with next-generation OSS
  - Provides a straightforward path to VoIP and IMS

- Experienced supplier
  - Multi-year experience voice, voice over IP and network transformation solutions
  - Extensive portfolio of access and aggregation solutions

ADTRAN

20 YEARS OF EXCELLENCE
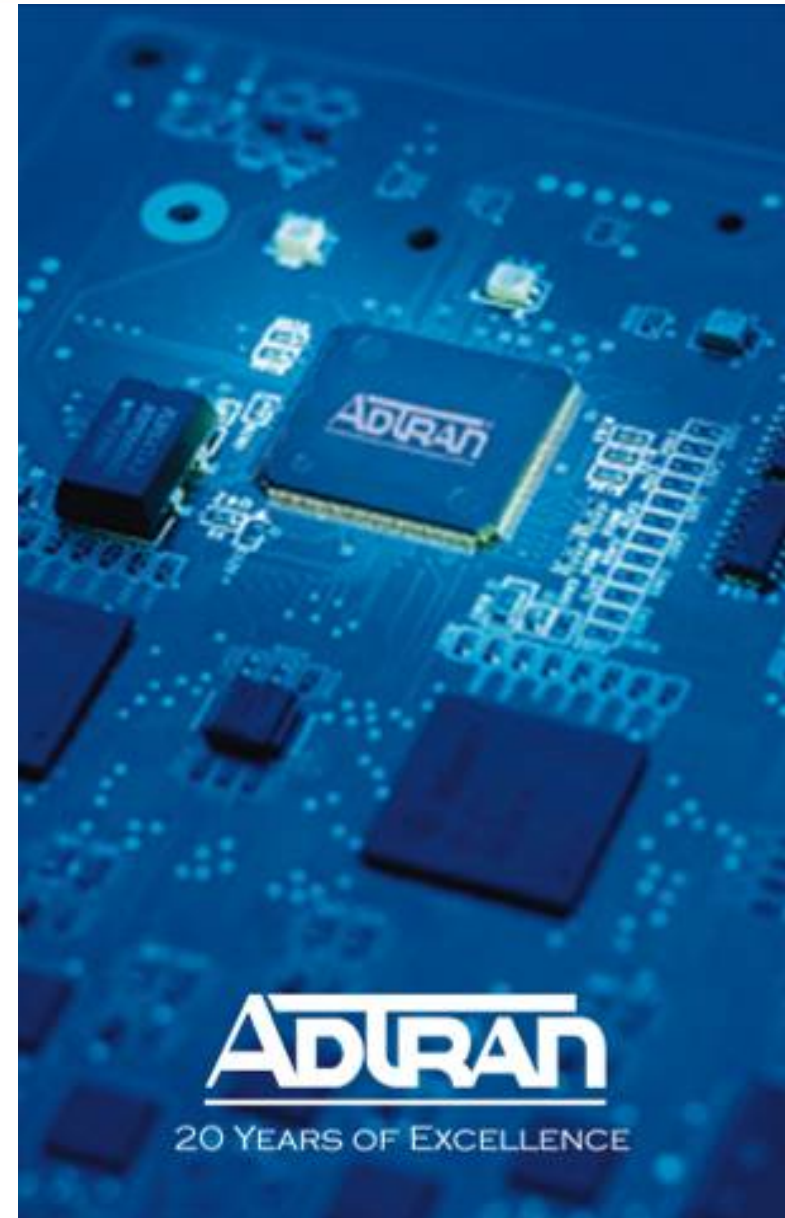
- # ESA Resource Module
  - SIP Proxy ESA Resource Module
  - Integrated ESA Functionality
    - Local POTS Subscriber Calling
    - Emergency POTS
  - Scalable ESA Domains
  - Flexible Application Support
    - RPOTS
    - Combo DSL
    - FTTP