Transforming the Local Exchange Network

Lawrence Vanston, Ph.D.
President,
Technology Futures, Inc.

lvanston@tfi.com

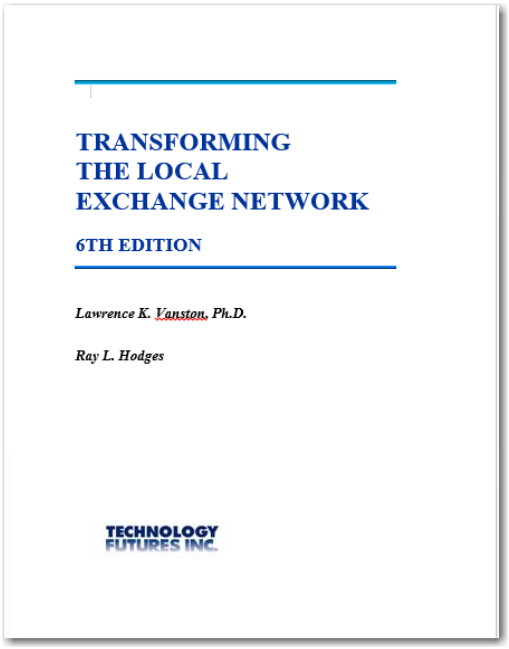
TFI Communications Technology Asset Valuation Conference

January 28-29, 2015

Radisson Downtown
Austin, Texas

13740 Research Blvd., Bldg. C-1 • Austin, Texas 78750
(512) 258-8898 • www.tfi.com

TECHNOLOGY FUTURES INC.



- TLEN
- 6th Edition, 2013
- Updates in progress
- 7th Edition, to appear 2015

TECHNOLOGY FUTURES INC.

Factors to Consider

- ILEC Access Line and DSL Losses
- The Demand for VHS Broadband* Access
- Further Deployment of VHS Broadband
- Deployment of Fixed Wireless Broadband
- Demand for 100 Mb/s and Above
- Transfer of Metallic Feeder Cable and Narrowband Switching/Circuit Equipment
- Transition to Non-Metallic Distribution Architectures

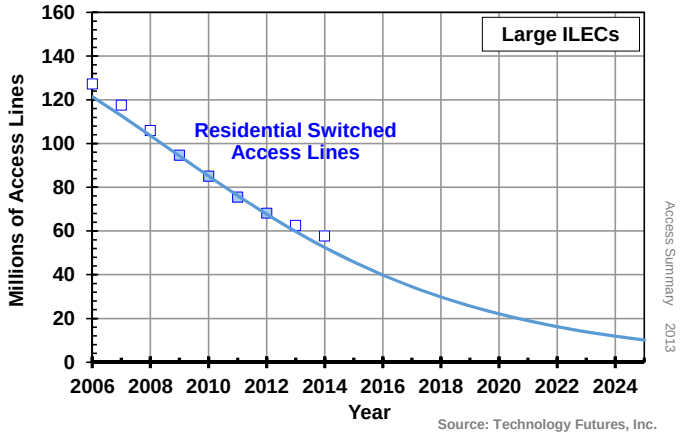
TECHNOLOGY FUTURES INC.

* At least 10 Mb/s downstream

ILEC Access Line Losses

TECHNOLOGY FUTURES INC.

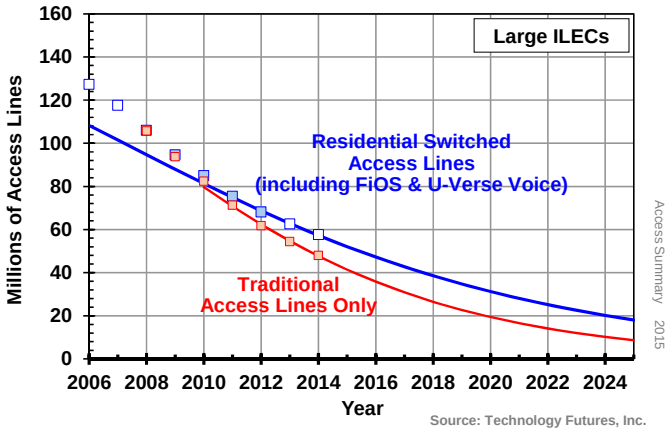
Switched Access Lines – Three Largest ILECs - 2013 Forecast



Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

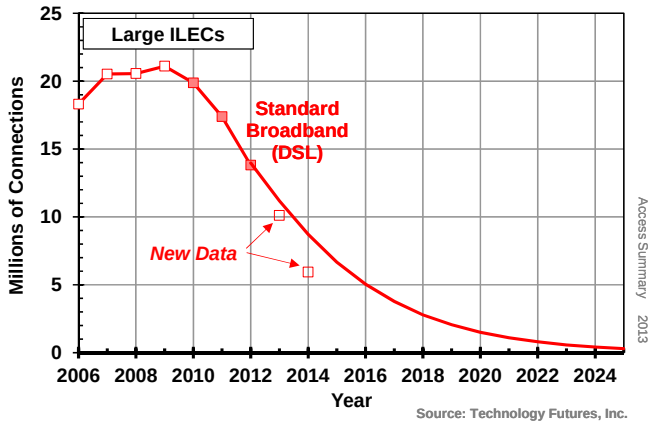
Switched Access Lines – Three Largest ILECs - Updated



Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

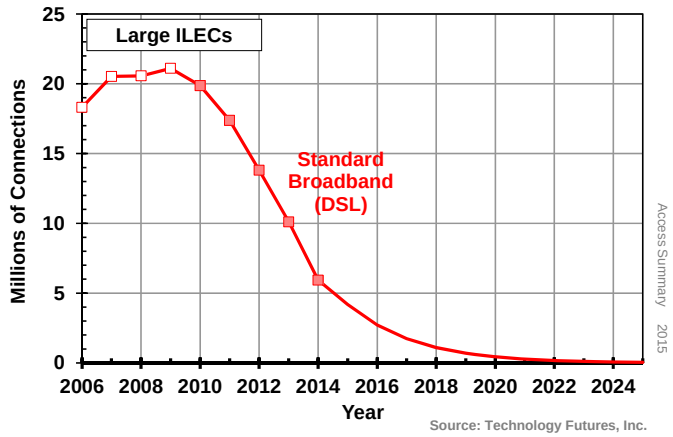
DSL Subscribers– Three Largest ILECs - 2013 Forecast



Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

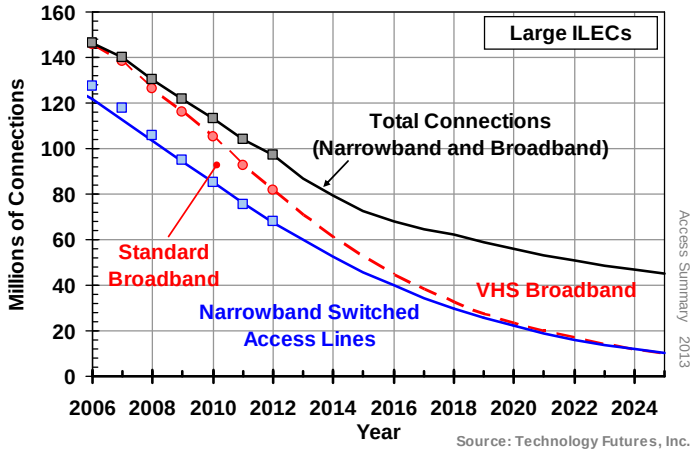
DSL Subscribers– Three Largest ILECs - Updated



Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

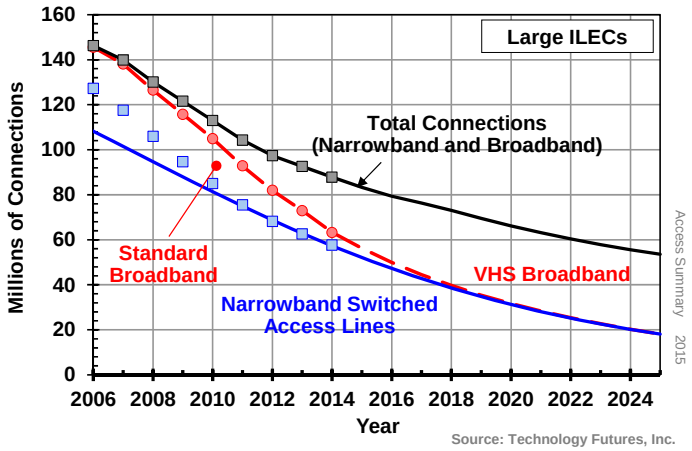
Total Connections – Three Largest ILECs - 2013 Forecast



Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

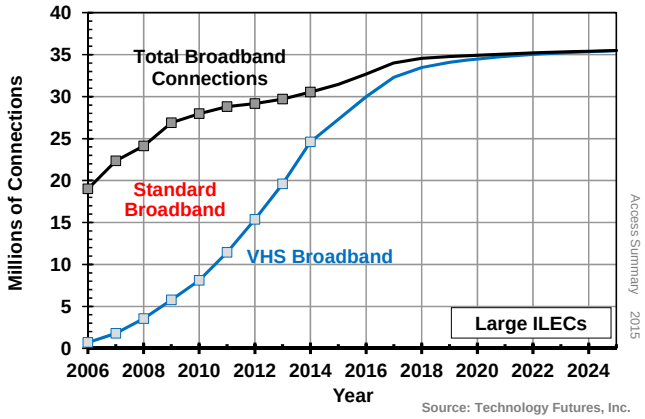
Total Connections – Three Largest ILECs - Updated



Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

Broadband Subscribers– Three Largest ILECs - Updated



Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

Industry Broadband Forecasts

TECHNOLOGY FUTURES INC.

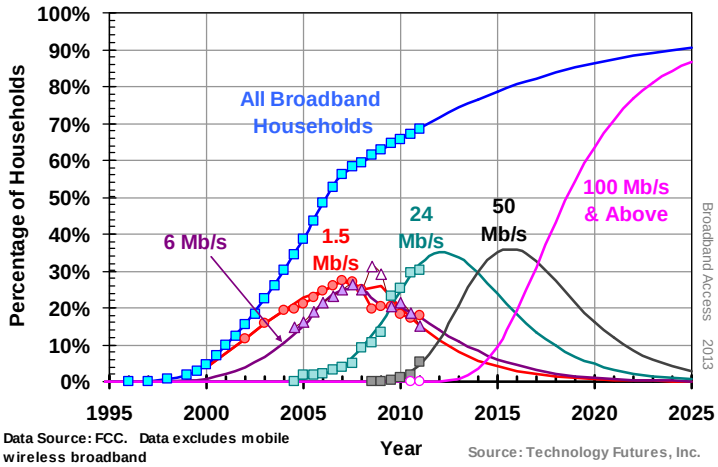
Broadband Generations,
Data Rate Categories*

Nominal	Range	
1.5 Mb/s	Less than 3 Mb/s	
6 Mb/s	At least 3 Mb/s and less than 10 Mb/s	
24 Mb/s	At least 10 Mb/s and less than 25 Mb/s	VHS Broadband
50 Mb/s	At least 25 Mb/s and less than 100 Mb/s	
100 Mb/s	At least 100 Mb/s and less than 300 Mb/s	
300 Mb/s	At least 300 Mb/s (Includes 1 Gb/s)	

*These are based on downstream, but upstream is becoming important also.

TECHNOLOGY FUTURES INC.

Broadband Households by Nominal Data Rate - 2013 Forecast



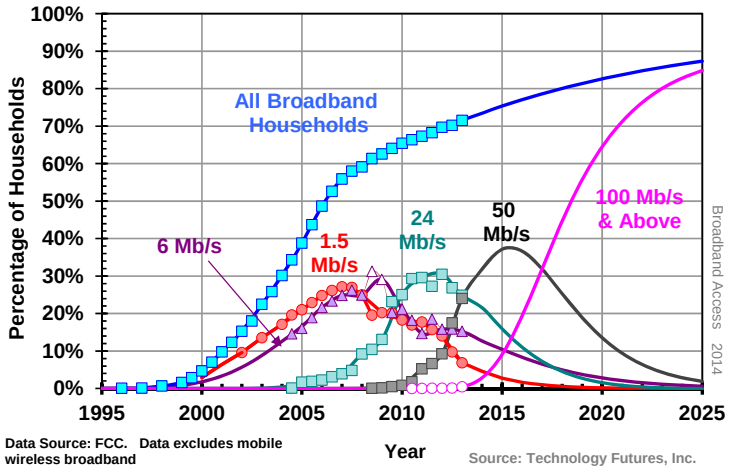
Data Source: FCC. Data excludes mobile wireless broadband

Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

 15

Broadband Households by Nominal Data Rate - Updated



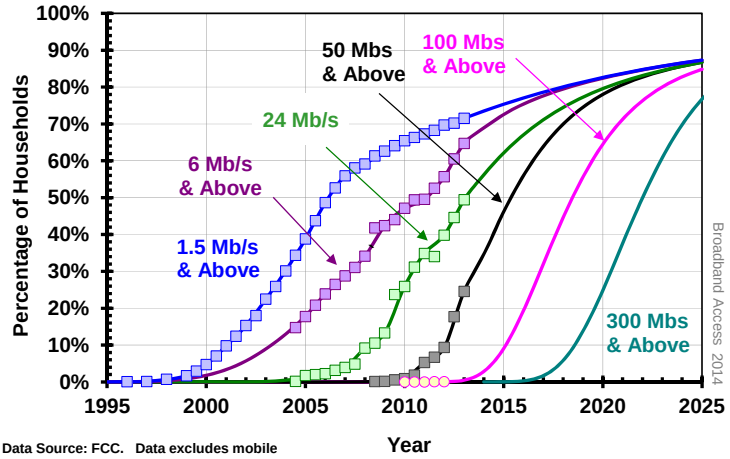
Data Source: FCC. Data excludes mobile wireless broadband

Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

 16

Broadband Households by Nominal Data Rate - Updated

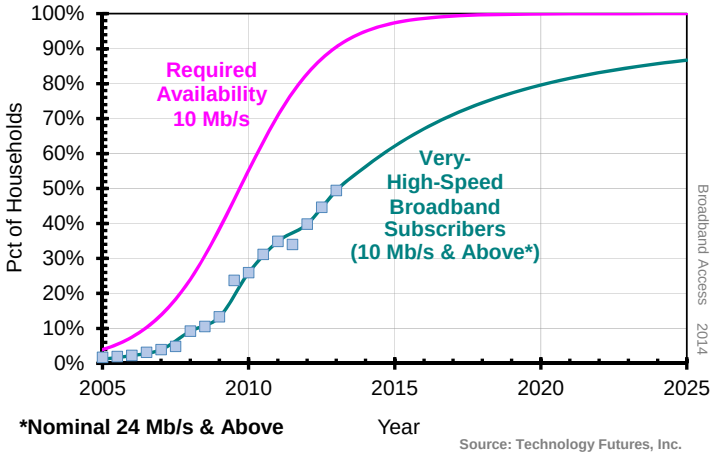


Data Source: FCC. Data excludes mobile wireless broadband

Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

Availability vs Subscribers, 10 Mb/s & Above - Updated

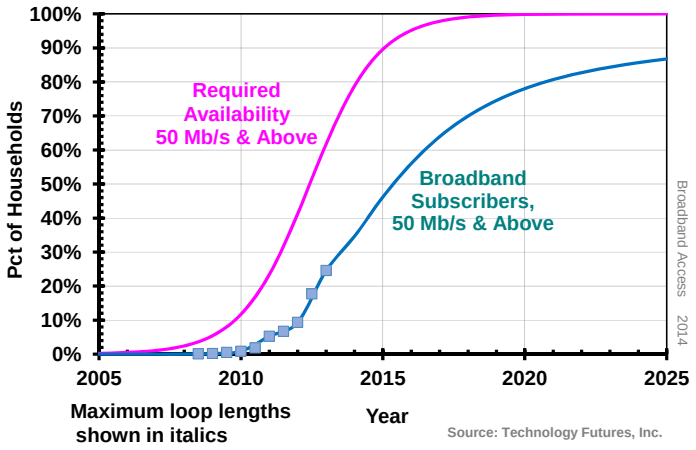


*Nominal 24 Mb/s & Above

Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

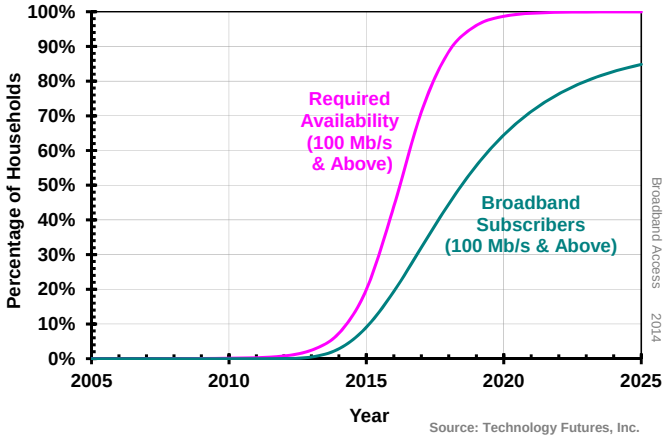
Availability vs Subscribers, 50 Mb/s & Above - Updated



Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

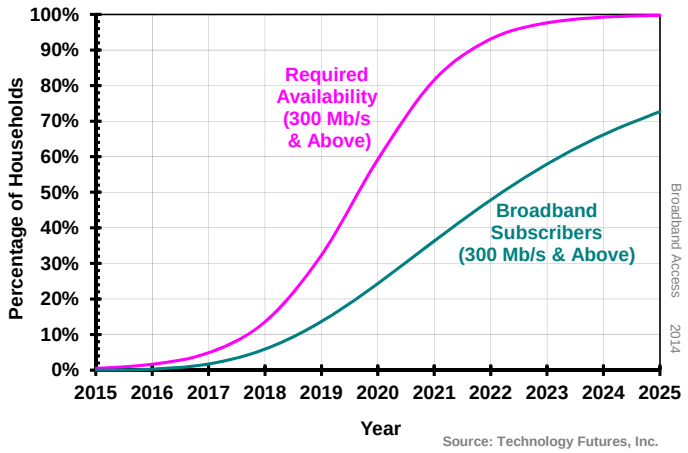
Availability vs Subscribers, 100 Mb/s & Above - Updated



Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

Availability vs Subscribers, 300 Mb/s & Above - Updated



Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

Deployment of VHS Broadband To Additional Areas

TECHNOLOGY FUTURES INC.

Deployment of VHS Broadband To Additional Areas

- Drivers
  - Bandwidth needs
  - Government policy
  - Competition
- Constraints
  - Capital cost and constraints
  - Government policy (or threat thereof)
  - Lack of completion
  - Willingness/Ability to pay

TECHNOLOGY FUTURES INC.

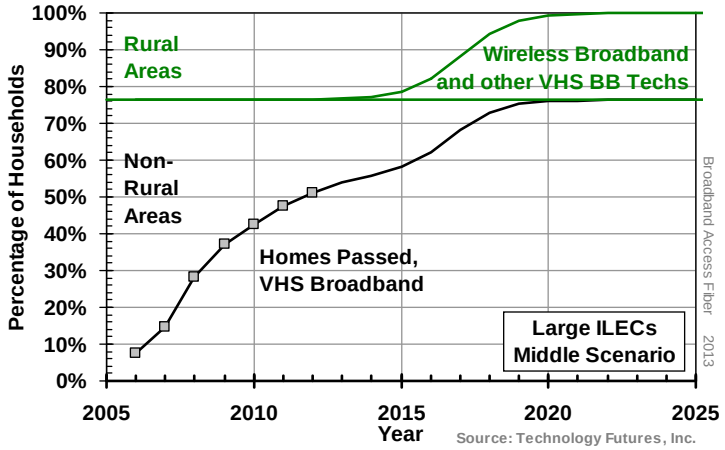
Deployment of VHS Broadband To Additional Areas - Alternatives

- Fiber to the Node* (FTTN)
- Fiber to the Premises (FTTP)
- Fixed Wireless
- Mobile Wireless
- Hybrid Fiber Coax (HFC)
- Do nothing – lose customers

*Includes VDSL, VDSL2, ADSL2, ADSL2+

TECHNOLOGY FUTURES INC.

VHS Broadband (10 Mb/s & Above) Deployment - 2013 Middle Scenario

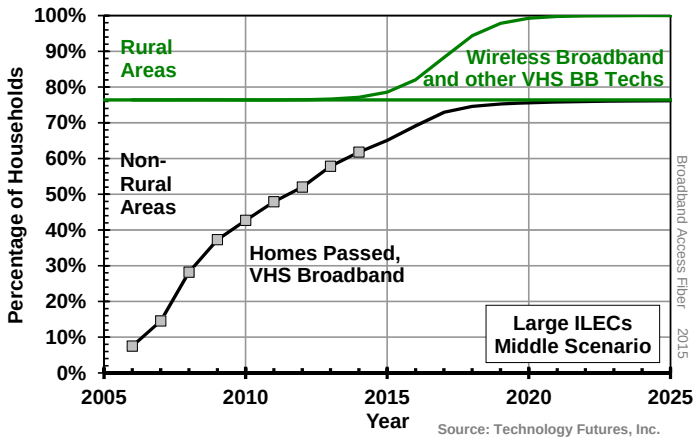


Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

 25

VHS Broadband (10 Mb/s & Above) Deployment - Updated

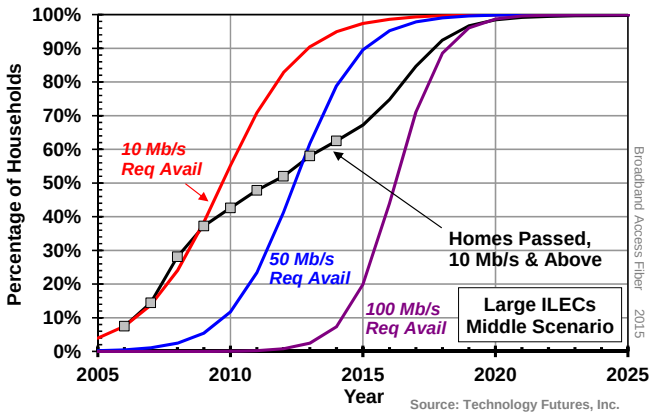


Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

 26

VHS Broadband Availability and Deployment – Middle Scenario - Updated



TECHNOLOGY FUTURES INC.

Transfer of Voice from Metallic Cable to VHS Broadband (Not Updated)

From 2013 TLEN, 6th Edition
Updates in progress

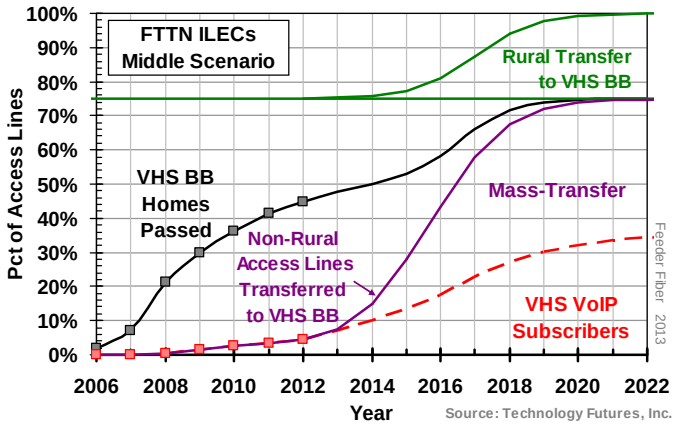
TECHNOLOGY FUTURES INC.

Transfer of Voice from Metallic Cable to VHS Broadband

- Drivers
  - Operations and maintenance cost savings
  - Business focus
  - Alternatives available or in place
  - Get unproductive assets off the books
- Constraints
  - Capital cost and constraints – Issues with VoIP
  - Customer inconvenience & resistance
  - Government regulation
  - Inertia & value in waiting

TECHNOLOGY FUTURES INC.

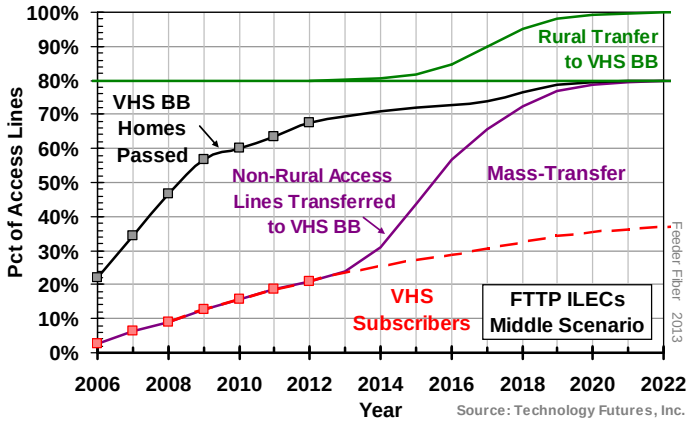
Transfer of Narrowband Access Lines to VHS Broadband – FTTN ILECs



From 2013 TLEN, 6th Edition
Updates in progress

TECHNOLOGY FUTURES INC.

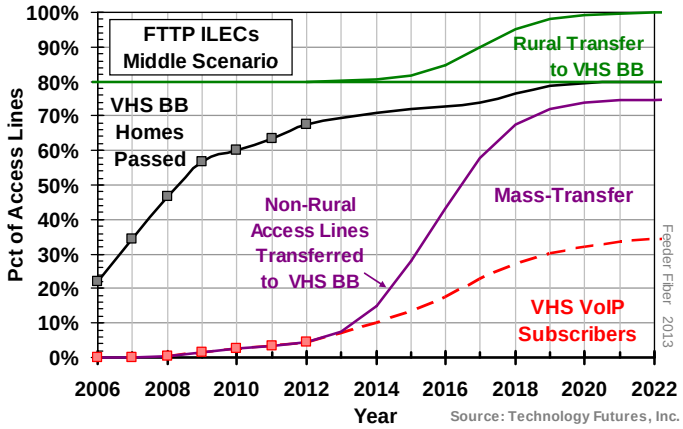
Transfer of Narrowband Access Lines to VHS Broadband – FTTP ILECs, Cable



From 2013 TLEN, 6th Edition
Updates in progress

TECHNOLOGY FUTURES INC.

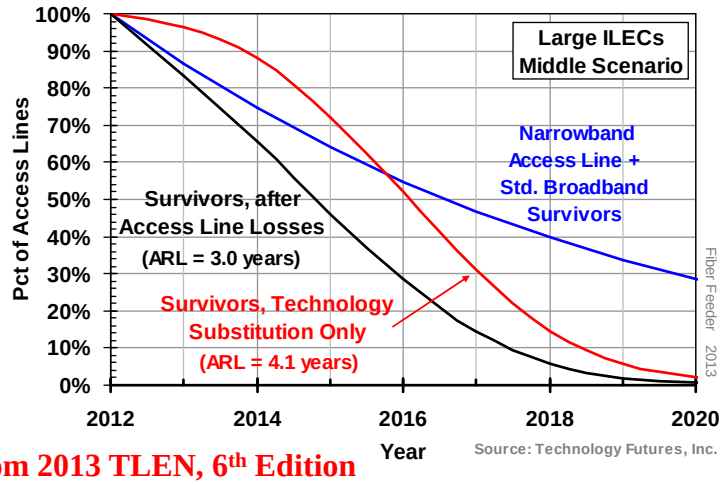
Transfer of Narrowband Access Lines to VHS Broadband – FTTP ILECs,Switching



From 2013 TLEN, 6th Edition
Updates in progress

TECHNOLOGY FUTURES INC.

Metallic Feeder Cable Survivor Curves

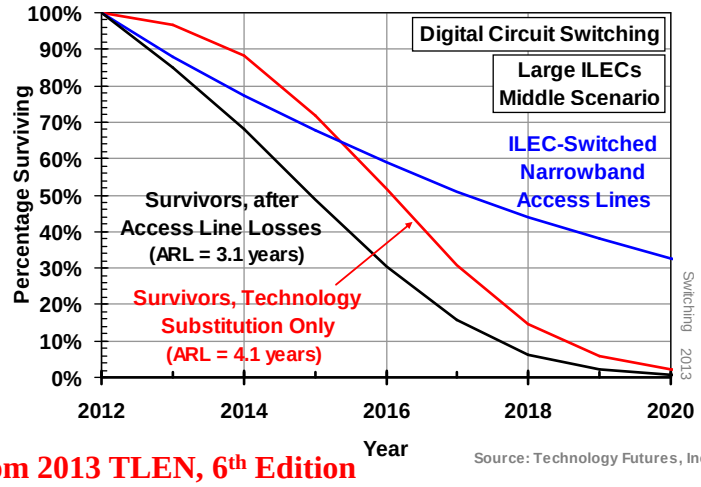


Source: Technology Futures, Inc.

From 2013 TLEN, 6th Edition
Updates in progress

TECHNOLOGY FUTURES INC.

Digital Switching Survivor Curves



Source: Technology Futures, Inc.

From 2013 TLEN, 6th Edition
Updates in progress

TECHNOLOGY FUTURES INC.

Transition from Metallic Distribution Cable to Non-Metallic Distribution Architectures

TECHNOLOGY FUTURES INC.

Transition from Metallic Distribution Cable

- Drivers
  - Bandwidth requirements
  - Operations and maintenance savings
  - Capital cost in new builds
  - Competition
- Constraints
  - Capital cost and constraints
  - Customer disruption and disatisifaction
  - Need not apparent

TECHNOLOGY FUTURES INC.

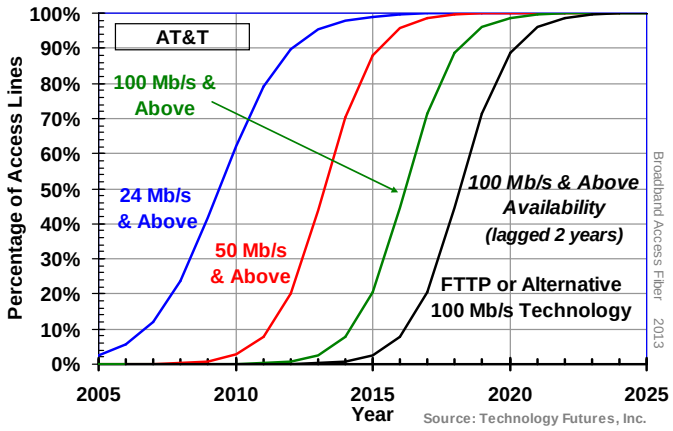
Deployment of 100 Mb/s Broadband To Additional Areas - Alternatives

- Fiber to the Node* (FTTN)
  - Will require fiber closer to premises
- Fiber to the Premises (FTTP)
- Fixed Wireless
- Mobile Wireless
- Hybrid Fiber Coax (HFC)
- Do nothing – lose customers

*Includes VDSL, VDSL2, ADSL2, ADSL2+

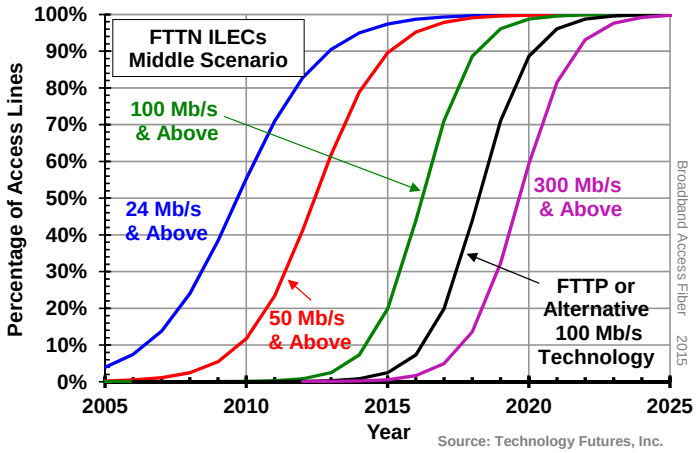
TECHNOLOGY FUTURES INC.

Non-Metallic Distribution Architectures – 2013 Middle Scenario



TECHNOLOGY FUTURES INC.

Non-Metallic Distribution Architectures – Middle Scenario - Updated



Source: Technology Futures, Inc.

TECHNOLOGY FUTURES INC.

TFI Industry Recommended Average Remaining Lives as of 1/1/2013

	Technology Substitution Only	After Access Line Losses
Digital Switching (Legacy)*	**3.1 - 5.3**	**2.5 - 3.7**
Circuit Equipment (Legacy)*	**2.8 - 4.5**	**2.4 - 3.4**
Metallic Cable - Feeder	**3.1 - 5.3**	**2.4 - 3.5**
Metallic Cable - Distribution	**3.1 - 7.0**	**2.6 - 5.2**
Fiber Cable (Legacy)**	**5.2 - 9.2**	**4.2 - 6.5**

* Applies to legacy equipment only. For VHS broadband equipment, TFI recommends an ARL based on a 4-10 year P-Life, depending on the equipment type.

** Applies to legacy standard single mode fiber only. For full spectrum fiber, TFI recommends an ARL based on a 20-25 year P-Life.

From 2013 TLEN, 6th Edition
Updates in progress

TECHNOLOGY FUTURES INC.

TFI Industry Recommended P-Lives as of 1/1/2013

	Technology Substitution Only	After Access Line Losses
Digital Switching (Legacy)*	**7-12**	**6-10**
Circuit Equipment (Legacy)*	**7-11**	**6-9**
Metallic Cable - Feeder	**8-16**	**7-13**
Metallic Cable - Distribution	**11-19**	**10-16**
Fiber Cable (Legacy)**	**13-24**	**11-20**

* Applies to legacy equipment only. For VHS broadband equipment, TFI recommends a 4-10 year P-Life, depending on the equipment type.

** Applies to legacy standard single mode fiber only. For full spectrum fiber, TFI recommends a 20-25 year P-Life.

From 2013 TLEN, 6th Edition
Updates in progress

TECHNOLOGY FUTURES INC.

TECHNOLOGY FUTURES INC.

(512) 258-8898 • www.tfi.com

Your Bridge to the Future

TECHNOLOGY FUTURES INC.

