OPEX Is Forever

Kermit Ross
Network Design Decisions Inc.

Technology Futures Asset Valuation Conference

January, 2014

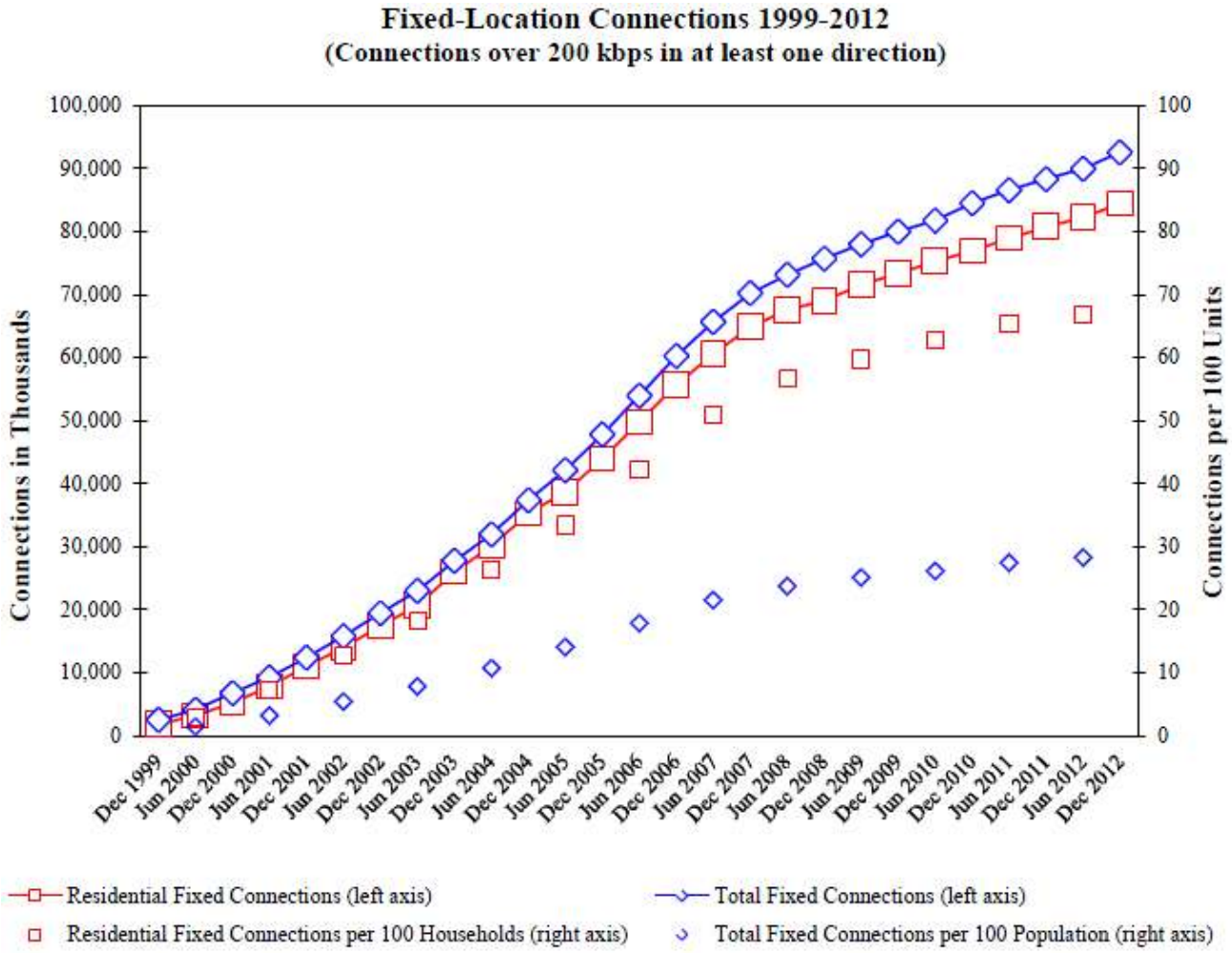
NDDI
PLAN THE NETWORK

Milestones

1915	Alexander Graham Bell made the first transcontinental call
1927	AT&T built the first transcont-inental cable
1975	First transcontinental cable removed from service

NDDI
PLAN THE NETWORK

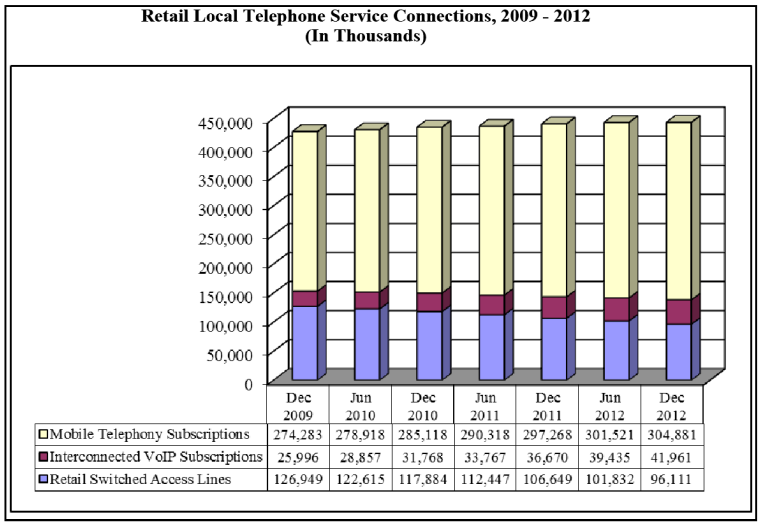
1999 - The Broadband Milestone



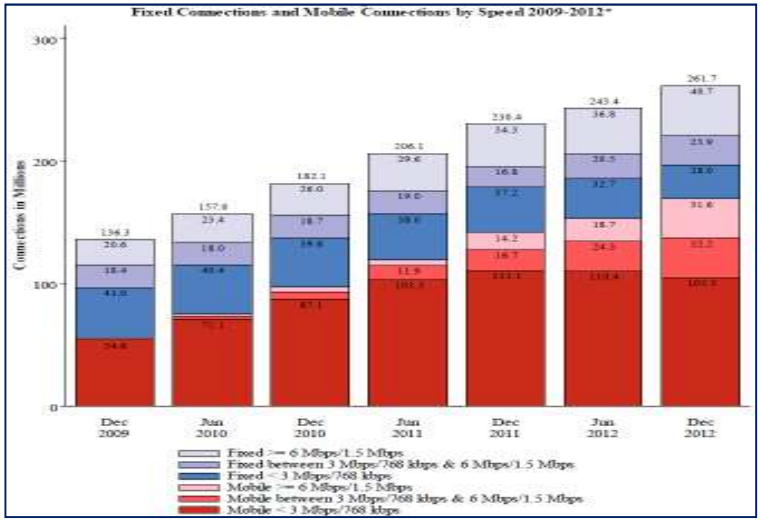
Source: FCC

NDDI
PLAN THE NETWORK

POTS To PIPES



	Dec 2009	Jun 2010	Dec 2010	Jun 2011	Dec 2011	Jun 2012	Dec 2012
Mobile Telephony Subscriptions	274,283	278,918	285,118	290,318	297,268	301,521	304,881
Interconnected VoIP Subscriptions	25,996	28,857	31,768	33,767	36,670	39,435	41,961
Retail Switched Access Lines	126,949	122,615	117,884	112,447	106,649	101,832	96,111



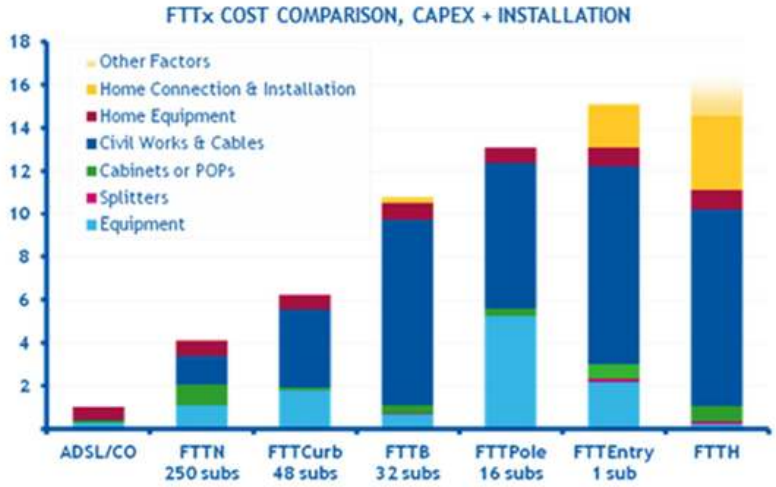
From 1/1/09 to 12/31/12, POTS lines in service declined by 30.838M.

During the same period, U.S. carriers added 12.572M Fixed broadband connections.

NDDI PLAN THE NETWORK

Source: FCC

Solving For "X"



The "deeper" the fiber, the higher the bandwidth per connection.

The "deeper" the fiber, the higher the CAPEX.

What about the OPEX?

Source: Alcatel-Lucent

NDDI
PLAN THE NETWORK

X's Cost A Lot Of Money!

Cost Drivers

- Size/distance…area, road mileage, HHs, etc
- Plowing difficulty…soils, bedrock, wetlands, etc
- Obstacles…roads, streams, etc

Total Costs/Route Mile

- Town $192,931
- Rural $ 26,728

Average Cost/Customer

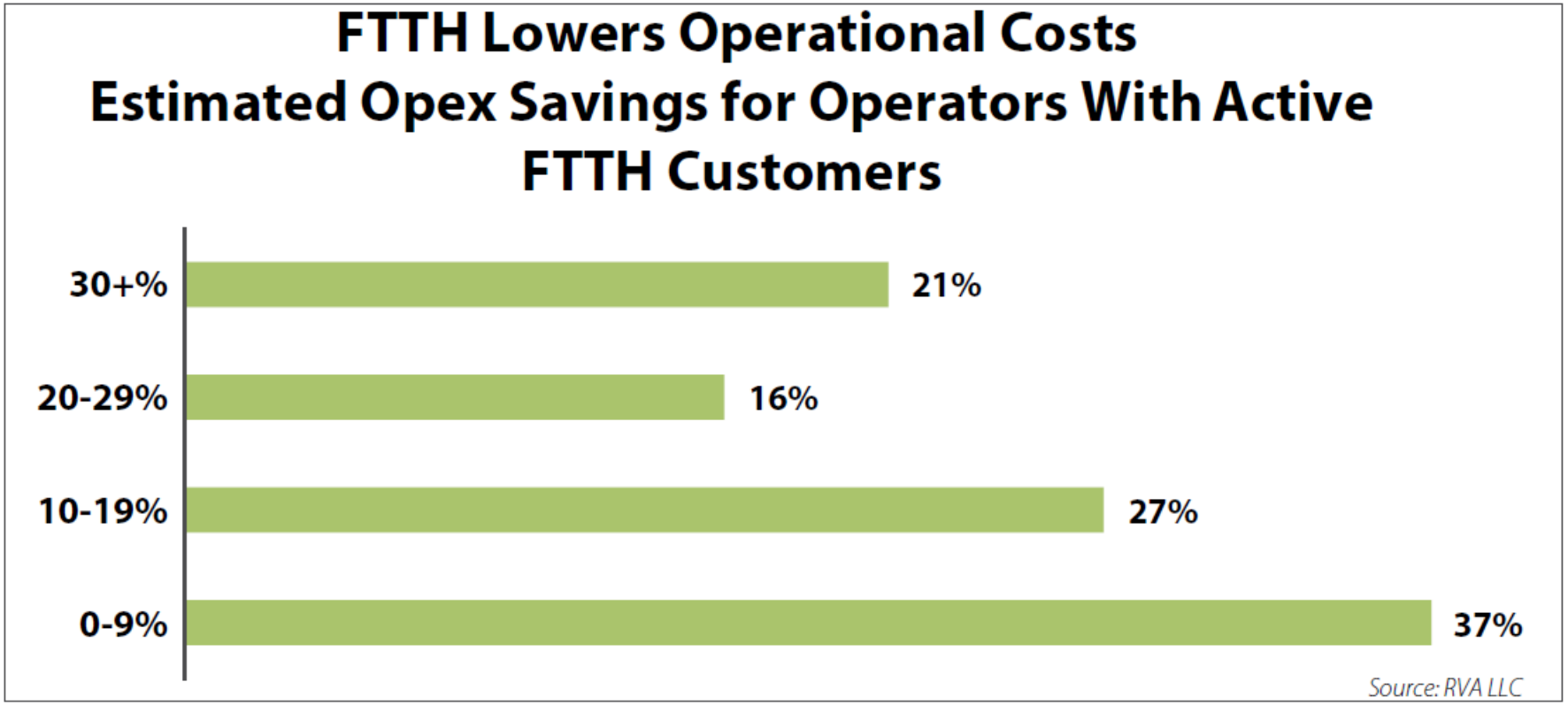
- Town $ 4,438
- Rural $ 9,286

OSP Costs = 58.5% of Total

NDDI PLAN THE NETWORK

Source: Vantage Point – Nebraska Rural IOCs Cost Study

Does More Fiber Mean Lower OPEX?

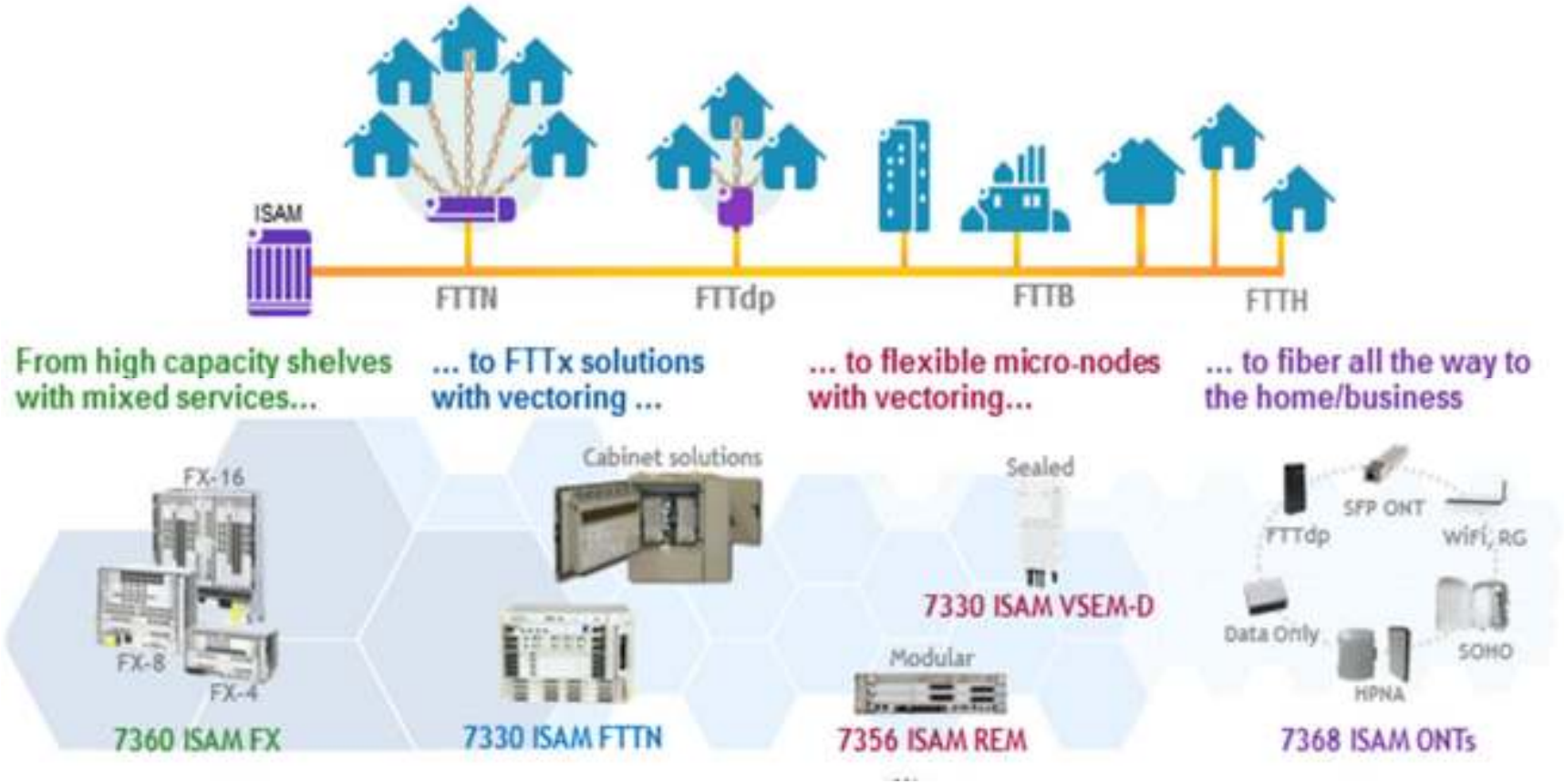


The Conventional Wisdom About FTTH OPEX

Source: Broadband Communities Magazine, Nov/Dec 2013

NDDI
PLAN THE NETWORK

More Fiber, More Electronics



The "Deeper" The Fiber, The More Electronics

NDDI PLAN THE NETWORK

Source: Alcatel-Lucent

OPEX Per Mile Of HFC Plant

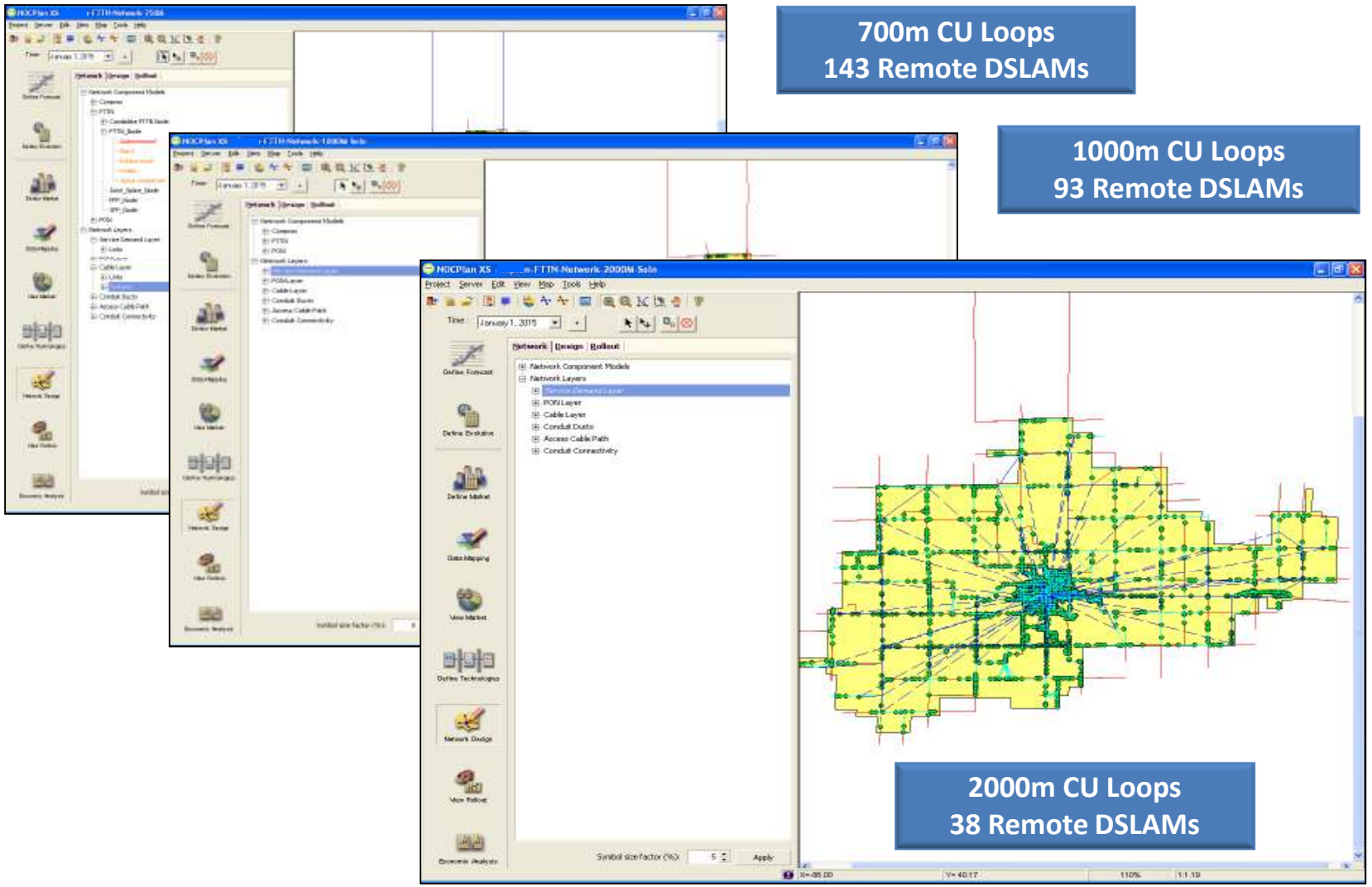
	HFC	% of Total
Technical Supervision	$ 42.03	3.81%
Service Trouble Truck Rolls (for plant problems)	$ 226.15	20.50%
Plant Maintenance Truck Rolls	$ 235.50	21.35%
Material Inventory	$ 49.64	4.50%
Electricity Consumption	$ 446.81	40.50%
Power Supply Battery Replacement	$ 43.49	3.94%
Power Supply Equipment Repair	$ 1.77	0.16%
RF Line Equipment Repair	$ 35.46	3.21%
Vehicle Accident Loss	$ 8.80	0.80%
Employee Injury Loss	$ 5.01	0.45%
Emergency Cable Repair	$ 8.51	0.77%
Total annual O&M expense per mile of OSP plant	**$ 1,103.17**	**100.00%**

**John Brouse, ITU-T Workshop All Star Network Access, Geneva, 2-4 June 2004*

NDDI PLAN THE NETWORK

(By way of Bob Harris, TFI Asset Valuation Conference, January 2012)

More Electronics Means More OPEX!



700m CU Loops
143 Remote DSLAMs

1000m CU Loops
93 Remote DSLAMs

2000m CU Loops
38 Remote DSLAMs

NDDI
PLAN THE NETWORK

Do The Math

143 Remote DSLAMs

143	*	400 w	=	57.2 kw
57.2	*	24 hrs	=	1,375 kwh
1,375	*	365 days	=	.5M kwh
.5M	*	$.10	=	$50K

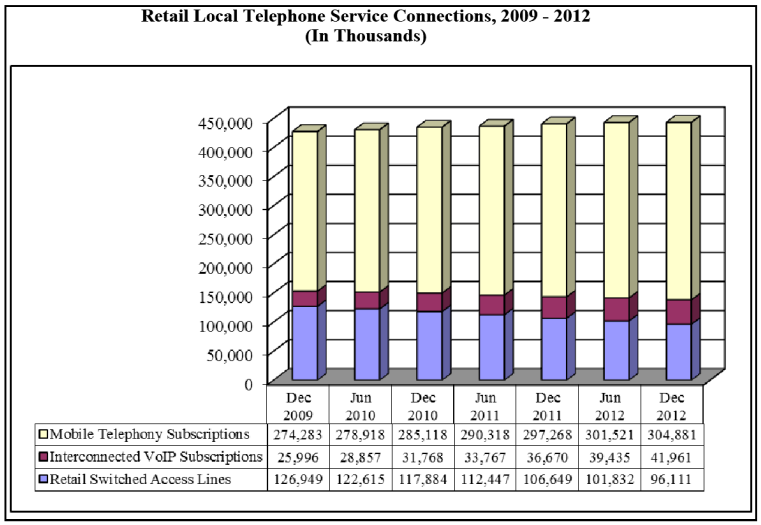
38 Remote DSLAMs

38	*	400w	=	15.2 kw
15.2	*	24 hrs	=	365 kwh
365	*	365 days	=	133K kwh
133	*	$.10	=	$13K

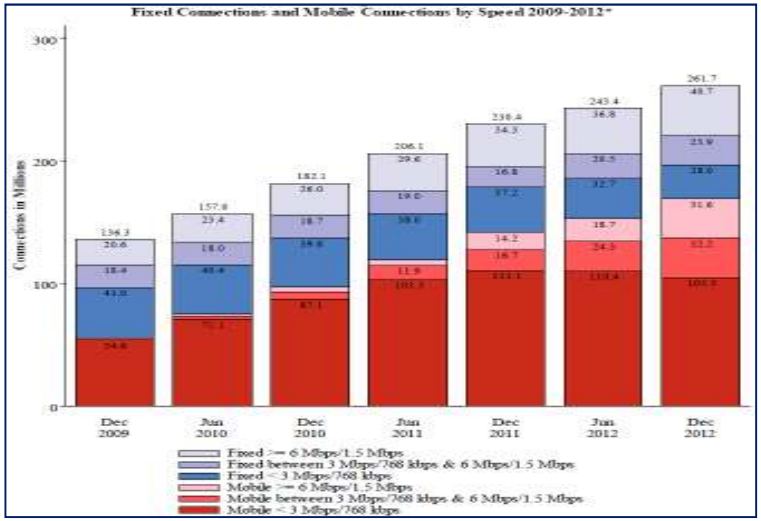
"Deeper" Fiber, Higher Speed, More OPEX

NDDI
PLAN THE NETWORK

Do The Math For POTS To PIPES



	Dec 2009	Jun 2010	Dec 2010	Jun 2011	Dec 2011	Jun 2012	Dec 2012
Mobile Telephony Subscriptions	274,283	278,918	285,118	290,318	297,268	301,521	304,881
Interconnected VoIP Subscriptions	25,996	28,857	31,768	33,767	36,670	39,435	41,961
Retail Switched Access Lines	126,949	122,615	117,884	112,447	106,649	101,832	96,111



30.838M * 2w = 60 Mw
60 Mw * 24 hrs = 1,440 Mwh
1,440 Mwh * 365 days = 525,600 Mwh
525,600 Mwh * $100 = $52.6M per year

12.572M * 10w =121 Mw
121 Mw * 24hrs = 2,984 Mwh
2,894 Mwh * 365 days = 1.056M Mwh
1.056M Mwh * $100 = $106M per year

NDDI
PLAN THE NETWORK

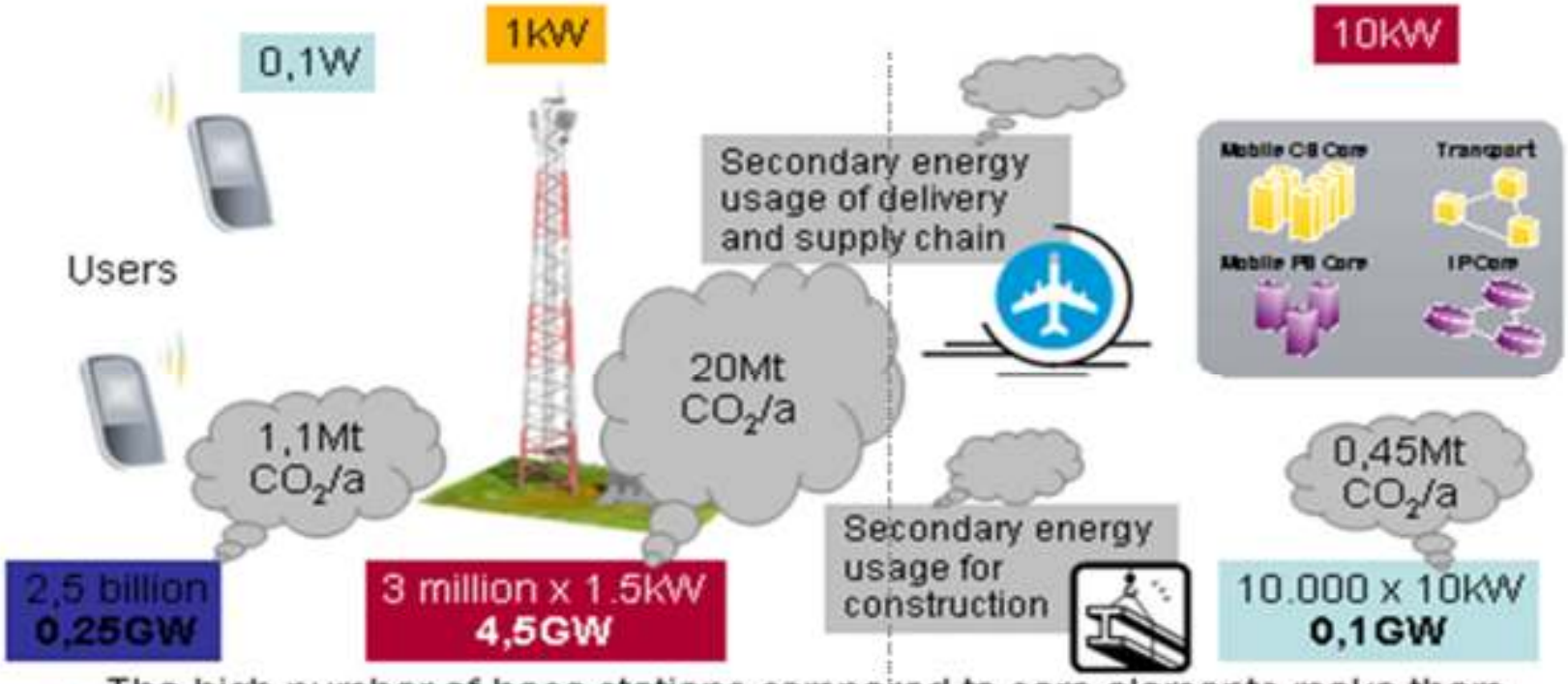
Source: FCC

And Now, A Word About Varmints

Ants like fiber, too!

PLAN THE NETWORK

How About 4G Wireless?



- The high number of base stations compared to core elements make them the largest energy consumer in mobile networks

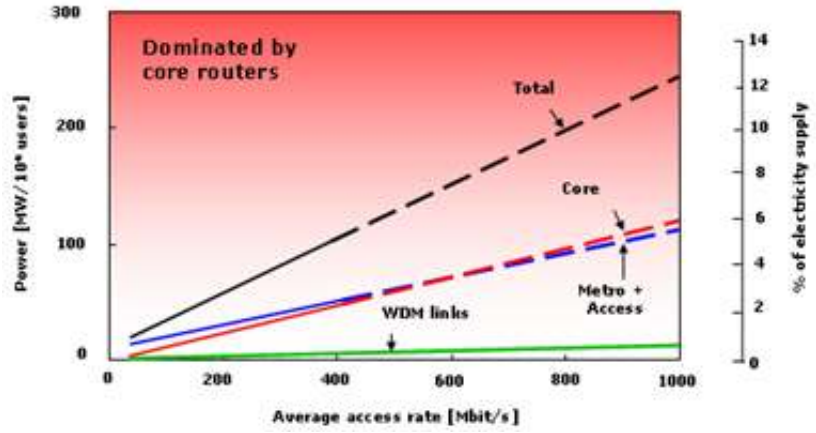
More Cells, More Power, More OPEX

NDDI PLAN THE NETWORK

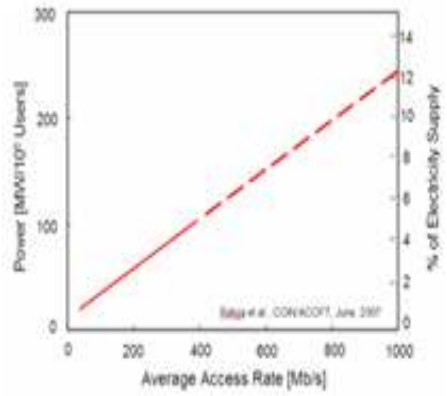
Source: LightReading Webinar ca 2008

The Power Of Broadband

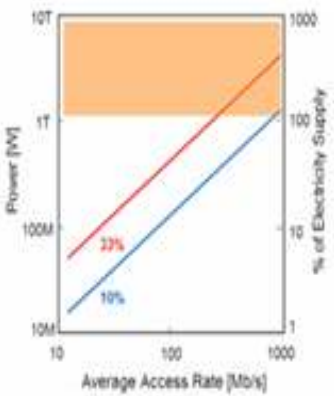
How Much Does It Take?



Do We Have What It Takes?



Data assumes router centric access model



Percentage of world's population with BB access

The transition from legacy TDM to broadband IP will take money, fiber, electronics and power.

Can everybody have a gigabit? What are the costs? Will we have enough power?

In the end, it's all about OPS and APPs!

Source: Light Reading Webinar ca 2008

NDDI
PLAN THE NETWORK

Conclusions And Recommendations

Your electric bill is going up.

Your choices of architecture, technology and topology will have profound implications for OPEX.

Power is a big deal.

Never forget the power of varmints.

OPEX is forever!

NDDI
PLAN THE NETWORK