Broadband Over Cable TV Network

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Agenda

- Cable TV Market
- Broadband Market
- Digital Media
- National Digital Communications Policy 2018
- Fixed Line Broadband Opportunity
- Technology Options
- Advantage Cable Operators
- Challenges
- Way Forward

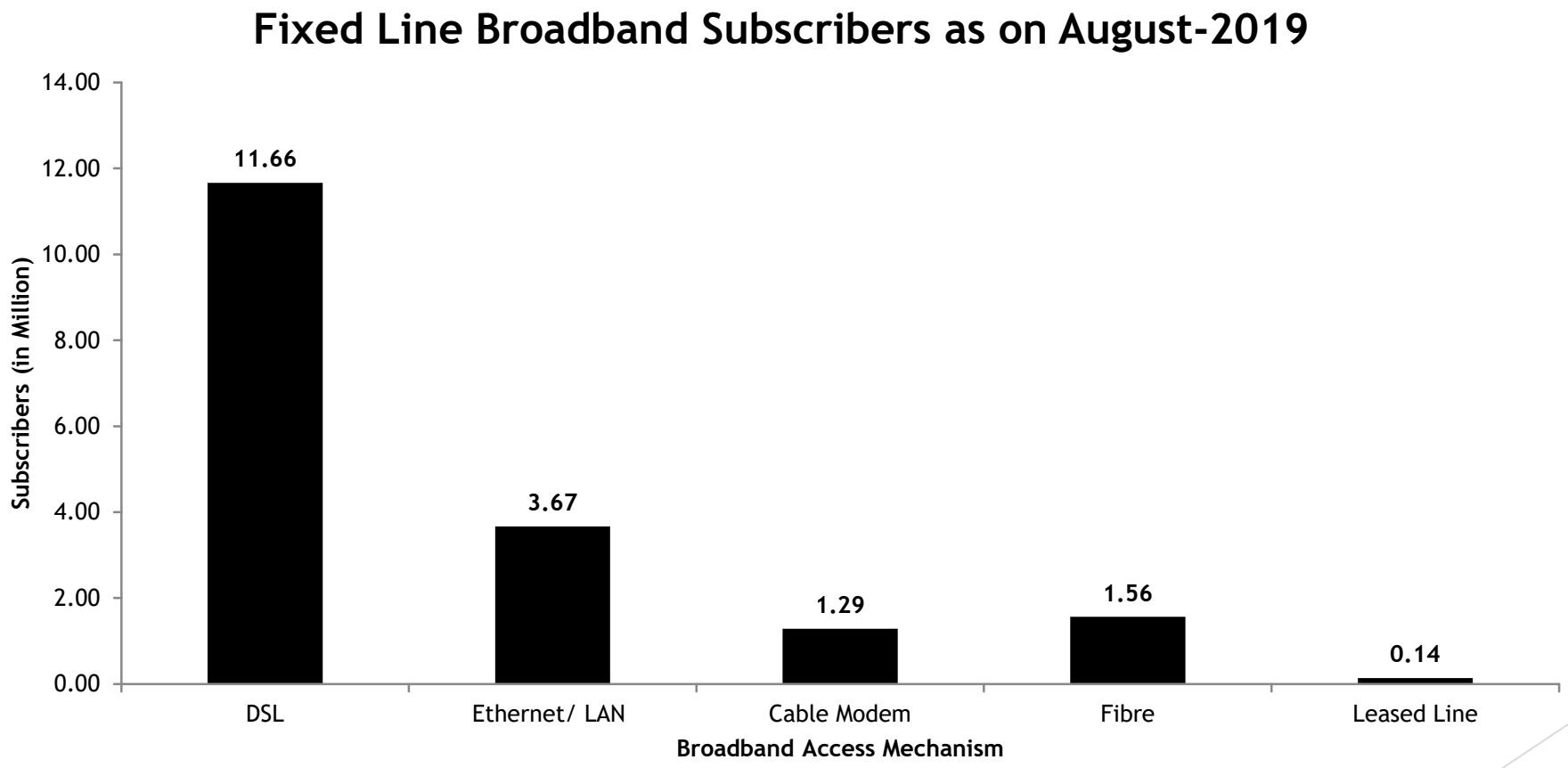
Cable TV Market

- Connecting 103 Million TV Households
- Tremendous Reach: Deep into Urban and Rural areas
- Facing intense competition from Direct To Home (DTH) and Over-The-Top (OTT) service providers
- Moving toward greater use of fibre in its last-mile infrastructure
- Evolving into converged networks post the digitization of Cable TV services
- Both cable and telecommunication companies are pursuing multiple-play offers to reduce churn and boost Average Revenues Per User (ARPU)

Broadband Market

- India has the world's second highest number of internet users after China, with around 665 million internet subscribers
- World's fastest growing market for mobile applications
- Fixed Line Broadband Subscribers: 18 Million
- Wireless Broadband Subscribers: 576 Million
- Public Wi-Fi Hotspots – 80,000
- Data consumption per wireless subscriber per month: 10.7 GB
- Data consumption doubling year on year basis

Technology Distribution of Fixed Line Broadband



Digital Media

- Online Gaming and Digital Media are the fastest growing segment in India
- In 2018, Digital Media grew 42% to reach INR169 billion
- Digital Media could be the second largest segment after television by 2021
- Over 200 million people accessed digital content through telco data bundles in 2018
- Paid video subscribers grew from around 7 million in 2017 to around 12-15 million in 2018
- Smart / connected TVs crossed 10 million

Source: EY

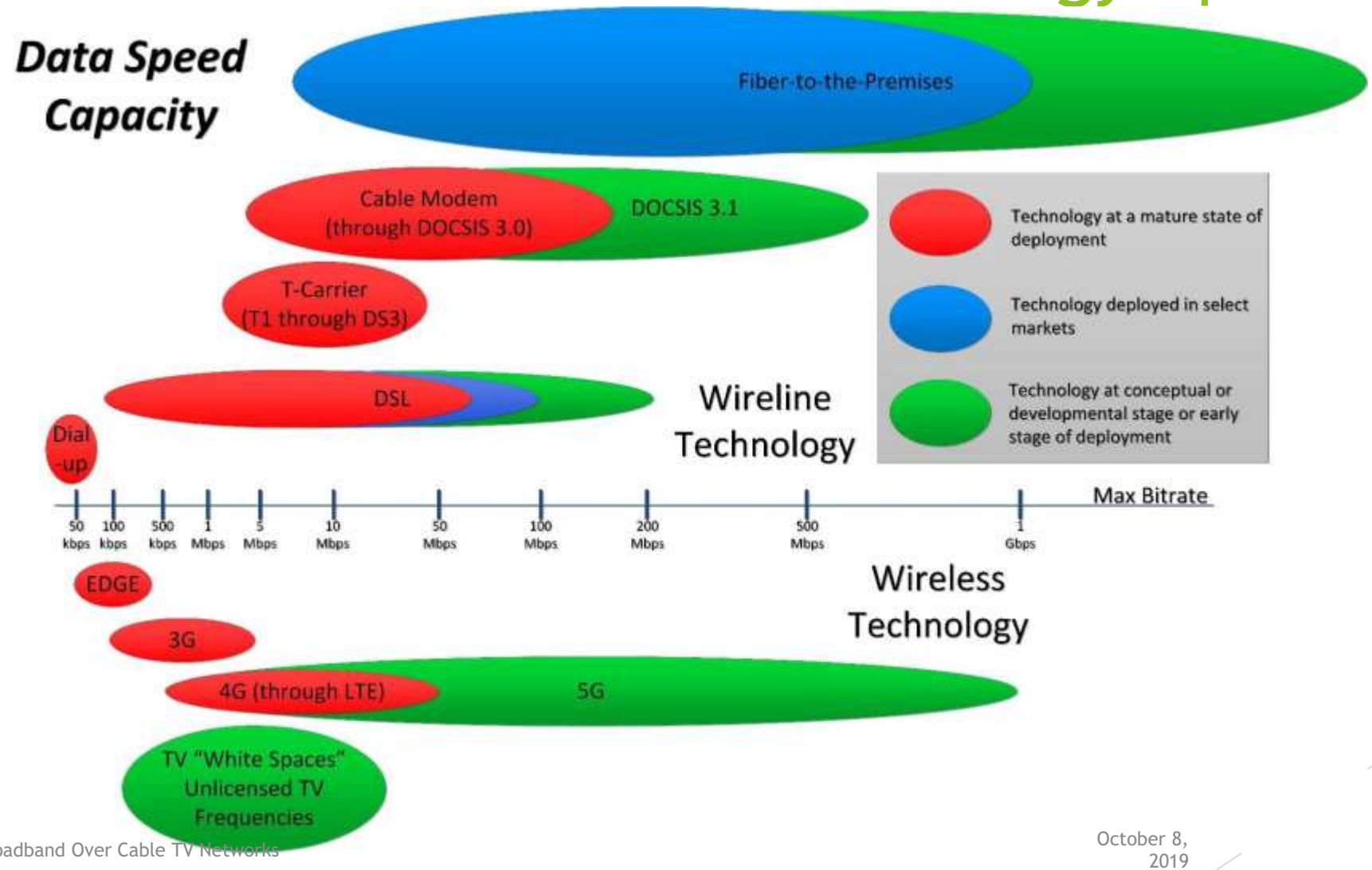
National Digital Communications Policy 2018

- Ubiquitous, Resilient and Affordable digital communications infrastructure and services
- Universal broadband connectivity at 50 Mbps to every citizen
- Enable Fixed Line Broadband Access to 50% of Households
- Enable deployment of public Wi-Fi Hotspots; to reach 5 million by 2020 and 10 million by 2022
- Providing 1 Gbps connectivity to all gram panchayats by 2020 and 10 Gbps by 2022
- Attracting investments of US$100 billion in the digital communications sector

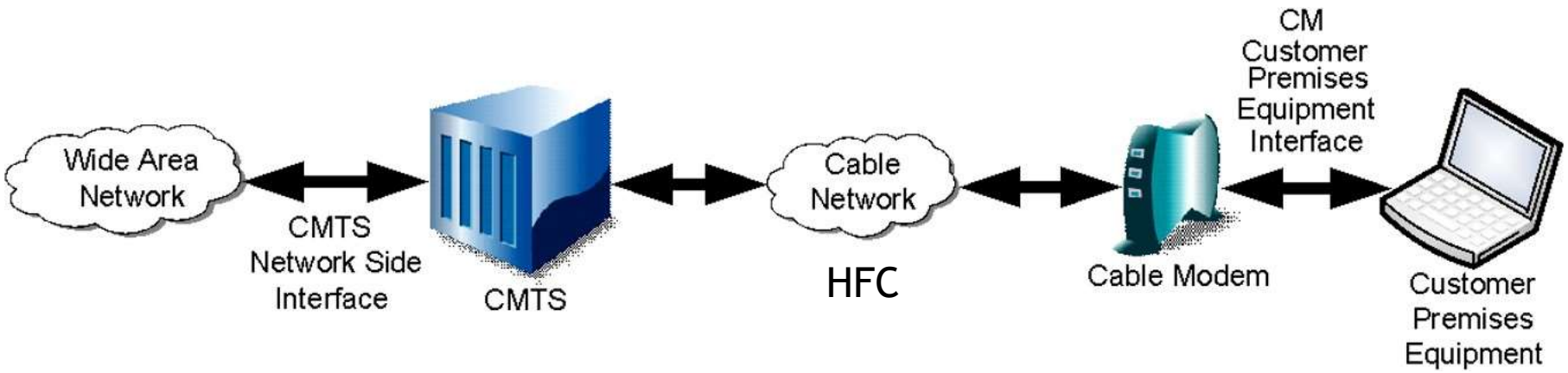
Fixed Line Broadband Opportunity

- Fixed Line broadband has a very small market share, so large opportunity for growth
- Large unmet demand in Urban as well as Rural areas
- Business connectivity requirements
- Fiberization of wireless networks
- Public Wi-Fi Hotspots
- Data offloading opportunity to reduce pressure on spectrum
- Multiple Options for upstream connectivity
- Pass through in revenue for upstream connectivity charges to VNO licensees

Technology Options



Simplistic view of DOCSIS Network



DOCSIS: Data over cable system interface standard

CMTS: Cable Modem Termination System

HFC: Hybrid fiber coaxial: a blend of optical and RF for distribution

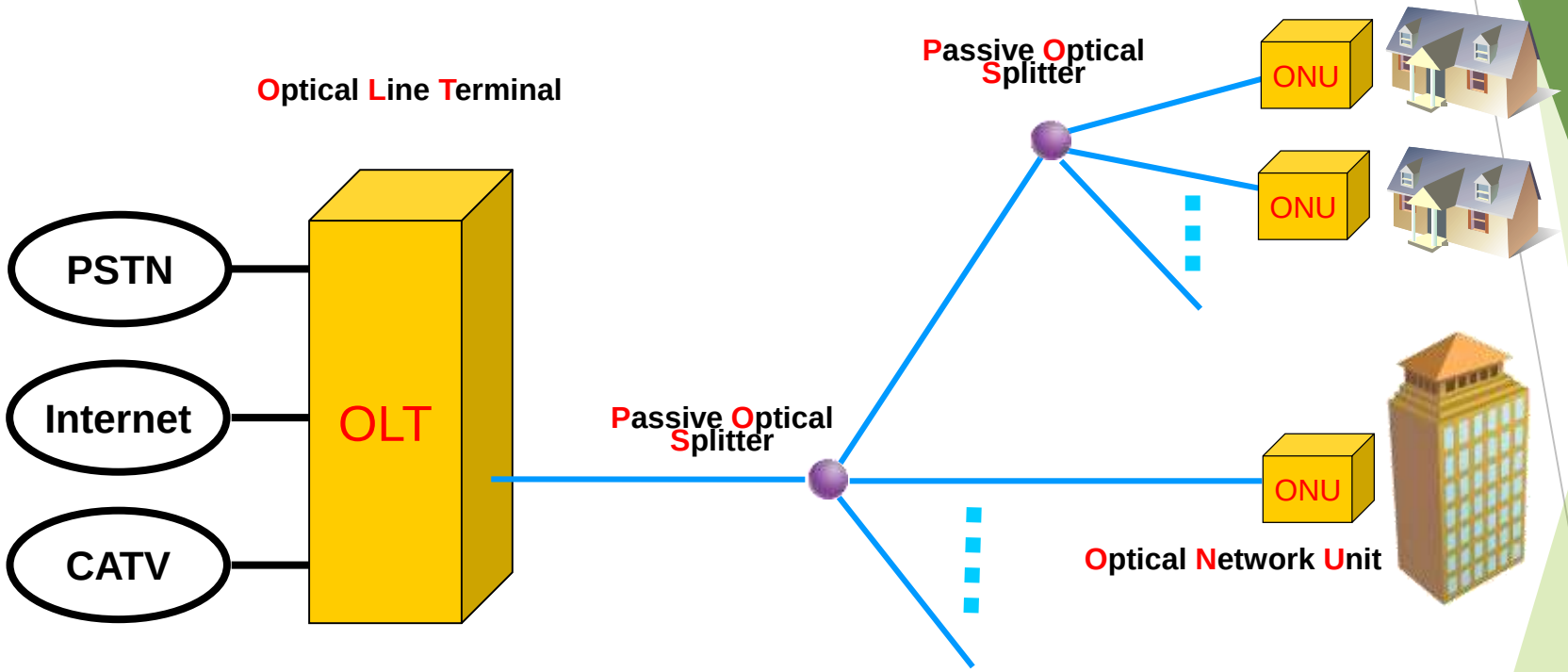
CM: Cable Modem

DOCSIS Version and Speed Evolution

Broadband Generation	DOCSIS 1.0	DOCSIS 1.1	DOCSIS 2.0	DOCSIS 3.0	DOCSIS 3.1
Highlights	Initial cable broadband technology	Added voice over IP service	Higher upstream speed	Greatly enhanced capacity	Capacity and efficiency progression
Downstream Capacity	40 Mbps	40 Mbps	40 Mbps	1 Gbps	10 Gbps
Upstream Capacity	10 Mbps	10 Mbps	30 Mbps	100 Mbps	1-2 Gbps
Production Date	1997	2001	2002	2008	2016

Cable Broadband Technology Evolution, 1990s to Present

Converged FTTH Network



- Passive Optical Network (PON) featuring one-to-multiple-point architecture;
- It consists of Optical Line Terminal (OLT), Optical Network Unit (ONU) and Passive Optical Splitter.

Advantage Cable Operators

- Digital Hybrid Fiber Cable (HFC) TV Network: Can be quickly upgraded to carry high-speed broadband
- Tremendous Reach: Deep into Urban and Rural areas
- Distributed Reach: Faster rollout to meet the growing demand
- Personal connect with more than 103 Million Households
- Converged delivery of Pay TV and Digital Media services
- Smart society services
- Increased Average Revenue Per User (ARPU)
- Multiple business models: Virtual Network Operators (VNO), Agents of ISPs, Passive Infrastructure Provider for TSPs
- Frugal engineering and low cost of maintenance resulting into affordable services

Challenges

- Regulatory compliances: separate policy and regulatory framework for cable TV and Internet Services
- License Fee on revenue realised from cable TV services
- Network upgradation for both-way communication
- Finance for upgradation of the networks
- Re-skilling of manpower
- Right of Way (RoW) permissions for under-ground and over-head cable networks in time bound manner at reasonable prices
- Digital transformation of organizations to fulfill customer expectations
- Affordability of Fixed Line Broadband Services

Way Forward

- Convergence of Legal, Licensing, and Regulatory Framework
- Incentives for faster rollout of fixed line broadband networks
- Finance for upgradation of networks at subsidized rates
- Nationwide awareness and skill development programs for Cable Operators
- Harmonized efforts by the Industry, Policy makers, and the Regulator
- Mission mode drive: Project Management Units (PMUs) in every State and Union Territories for addressing the issues on real time basis

Thanks