

Data Over Cable Service Interface Specification

DOCSIS

Applications

- High-speed data transfer to an existing cable TV (CATV) system.
- Uses HFC network to support upstream data.



Applications

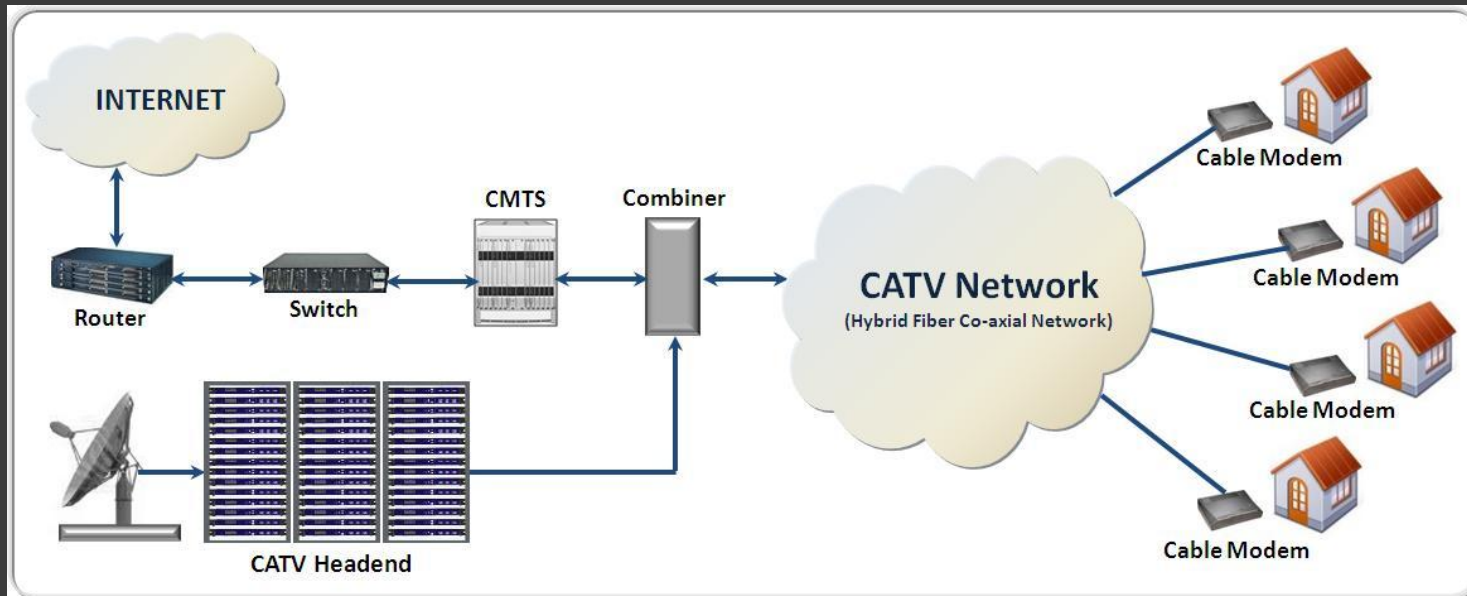
- Fastest deployment in North America is Shaw Cable's 250 Mbit/s download 15 Mbit/s upload.
- FCC urged U.S. providers to make 100 Mbit/s a standard speed available to 100 million households before 2020
 - DOCSIS, FiOS, and EFM are likely to achieve this speed on a large scale in that time frame.

Applications

- VOIP through PacketCable
- Uses IP to enable multimedia services
- Easily compromised by cloning FQDN

Topology

● Typical DOCSIS Implementation



Variations

DOCSIS

- 6Mhz Channels
- 42.88mbps/channel
- 256-QAM with SCDMA
- Upstream Trellis coded modulation

EuroDOCSIS

- 8Mhz Channels
- 55mbps/channel
- 256-QAM with SCDMA
- Upstream Trellis coded modulation

Version	Downstream					
	Channel configuration				DOCSIS throughput	EuroDOCSIS throughput
	Minimum selectable number of channels	Minimum number of channels that hardware must be able to support	Selected number of channels	Maximum number of channels		
1.x	1	1	1	1	42.88 (38) Mbit/s	55.62 (50) Mbit/s
2.0	1	1	1	1	42.88 (38) Mbit/s	55.62 (50) Mbit/s
3.0	1	4	m	No maximum defined	$m \times 42.88$ $(m \times 38)$ Mbit/s	$m \times 55.62$ ($m \times 50$) Mbit/s

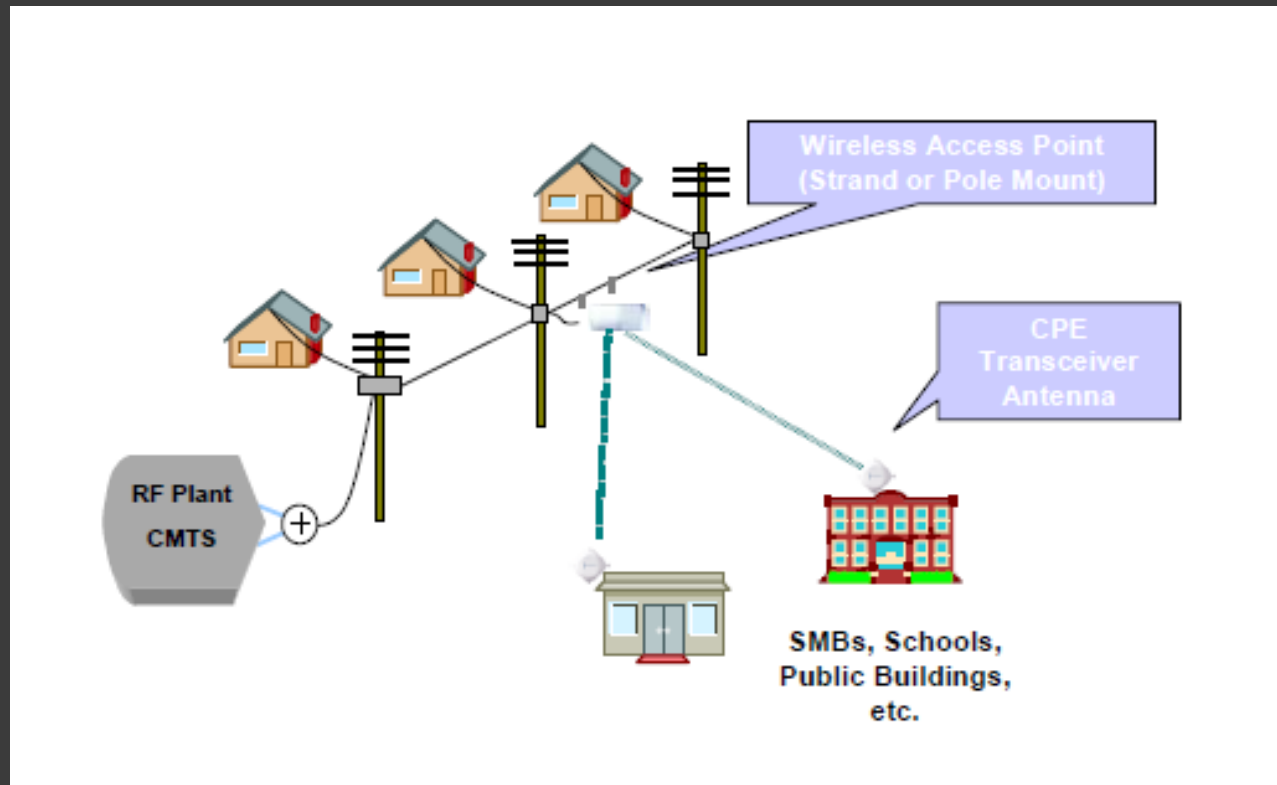
Channel configuration		Downstream throughput		Upstream throughput
Number of downstream channels	Number of upstream channels	DOCSIS	EuroDOCSIS	
4	4	171.52 (152) Mbit/s	222.48 (200) Mbit/s	122.88 (108) Mbit/s
8	4	343.04 (304) Mbit/s	444.96 (400) Mbit/s	122.88 (108) Mbit/s

Link Budget

- DOCSIS downstream link using 5.8GHz band for 2.5km link distance.

DESCRIPTION	VALUE	COMMENTS
Effective Isotropic Radiated Power (EIRP) – Sum of transmit Power Amp output (P_T) + transmitter antenna gain (G_T)	+33 dBm	FCC part 15.247 quasi-peak limit at 5.8 GHz is +36 dBm for point to multi-point applications. +33 dBm based on RMS power level plus margin for manufacturing variability
Receive antenna gain (G_R)	22 dBi	Dependent on antenna gain chosen
Carrier to noise minimum requirement	31.5 dB	Based on 256 QAM modulation
Received noise floor	-103 dBm	Theoretical noise floor in 6 MHz bandwidth plus 3dB receiver Noise Figure
Fade Margin + miscellaneous losses	7 dB	Inclusive of fast and slow fade environments and losses between antenna and radio

Link Budget



Market

- 49% household penetration in Canada.
- \$40 average high speed internet bill.

35 Million * 0.33 * 0.49 * \$40 = \$226 Million
with 17 million users.

Security

◎ BPI+/SEC

- Privacy across the network
- Cable service operator security

Encrypts data between CMTS and modem using 128-bit AES (SEC).



Security

- ⦿ Easiest way to gain access is by cloning modem.
- ⦿ ISP can trace to nearest node or tap.

References

- ◎ <http://en.wikipedia.org/wiki/DOCSIS>
- ◎ <http://eurasip.org/Proceedings/Ext/IST05/papers/111.pdf>
- ◎ <http://www.cablelabs.com/cablemodem/specifications/>