

Introdução

Redes WAN de Banda Larga

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REDES WAN DE BANDA LARGA

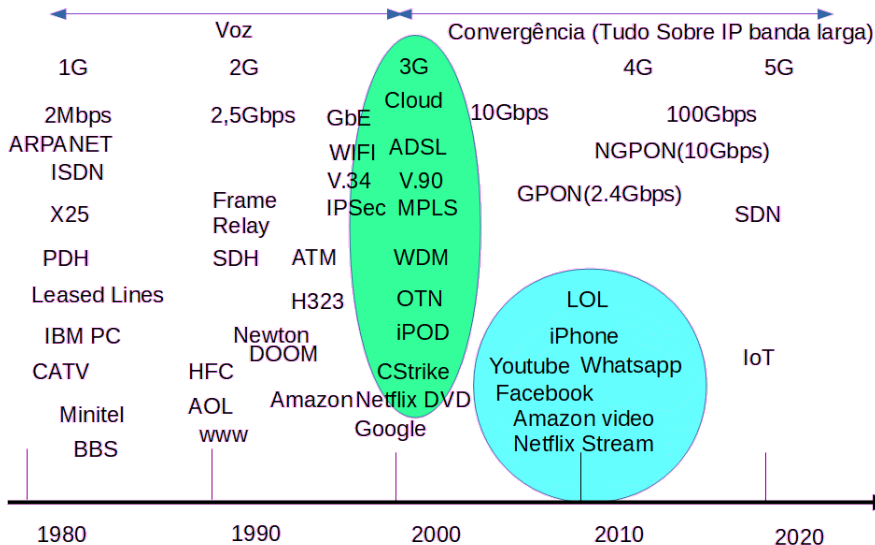
- 1 Introdução
 - Linha do Tempo
 - Tráfego

- 2 Tecnologias

- 3 Custos

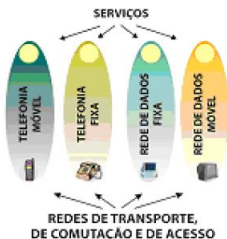
- 4 Topologia

Linha do Tempo - Redes



Tudo sobre IP

REDES VERTICAIS UNISSERVIÇO



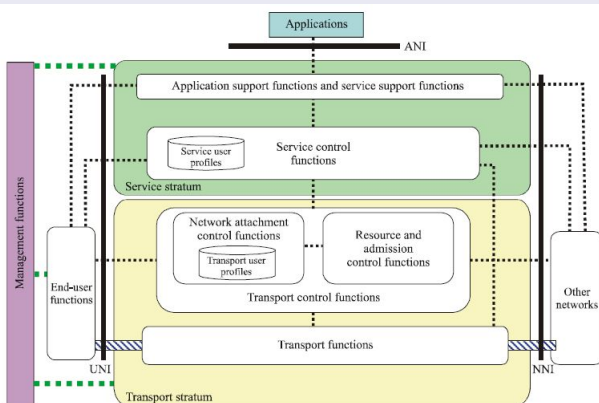
REDES HORIZONTAIS MULTISSERVIÇOS



Figura 4 - Ambiente Convergente – Tudo IP

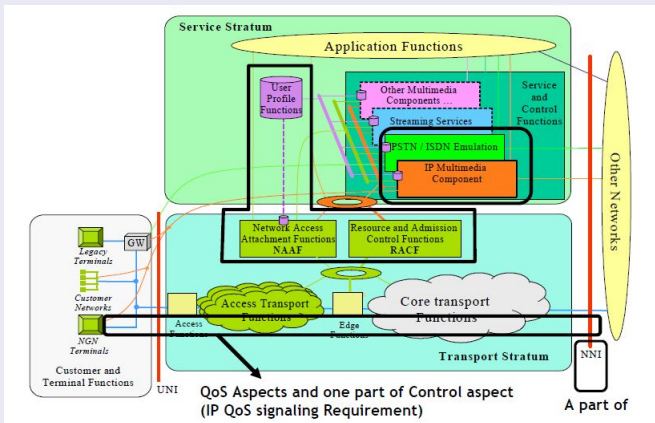
Fonte: UIT, 2005

Next Generation Network



Y.2012(09-2006)_F01

Next Generation Network



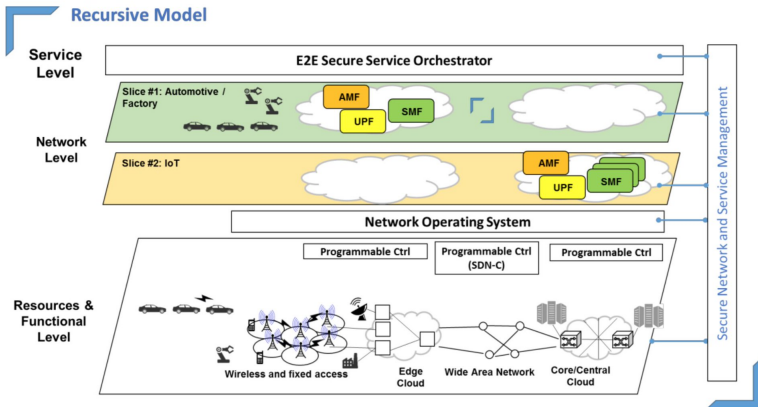
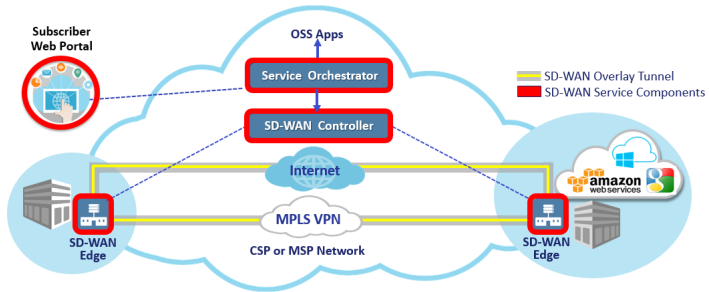


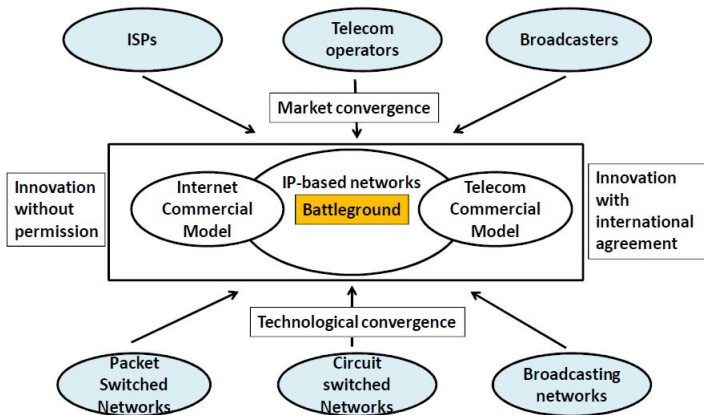
Figure 2-1: Overall Architecture

SDWAN

SD-WAN Service Components



Quem é Quem



Source: J. Horrocks, "NGN and Convergence Models, Myths, and Muddle", OECD NGN Foresight Forum, 3 October 2006. See: http://www.oecd.org/document/12/0,3343,en_2649_34223_37392780_1_1_1_1,00.html.

Volume de tráfego

IP Traffic, 2016–2021							
	2016	2017	2018	2019	2020	2021	CAGR 2016–2021
By Type (Petabytes [PB] per Month)							
Fixed Internet	65,942	83,371	102,960	127,008	155,121	187,386	23%
Managed IP	22,911	27,140	31,304	35,226	38,908	42,452	13%
Mobile data	7,201	11,183	16,646	24,220	34,382	48,270	46%
By Segment (PB per Month)							
Consumer	78,250	99,777	124,689	154,935	190,474	232,655	24%
Business	17,804	21,917	26,220	31,518	37,937	45,452	21%

Fonte: Cisco Visual Networking Index 2017

Utilização 2014

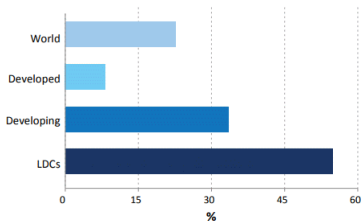
Rank	Upstream		Downstream		Aggregate	
	Application	Share	Application	Share	Application	Share
1	BitTorrent	36.35%	Netflix	31.62%	Netflix	28.18%
2	HTTP	6.03%	YouTube	18.69%	YouTube	16.78%
3	SSL	5.87%	HTTP	9.74%	HTTP	9.26%
4	Netflix	4.44%	BitTorrent	4.05%	BitTorrent	7.39%
5	YouTube	3.63%	iTunes	3.27%	iTunes	2.91%
6	Skype	2.76%	MPEG - Other	2.60%	SSL	2.54%
7	QVoD	2.55%	SSL	2.05%	MPEG - Other	2.32%
8	Facebook	1.54%	Amazon Video	1.61%	Amazon Video	1.48%
9	FaceTime	1.44%	Facebook	1.31%	Facebook	1.34%
10	Dropbox	1.39%	Hulu	1.29%	Hulu	1.15%
		66.00%		76.23%		73.35%



Table 2 - Top 10 Peak Period Applications - North America, Fixed Access

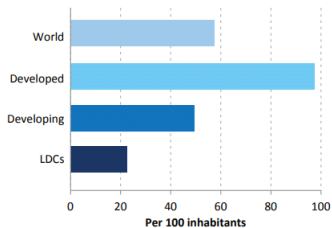
Acessos Móveis

Growth of mobile-broadband subscriptions, CAGR, 2012-2017*



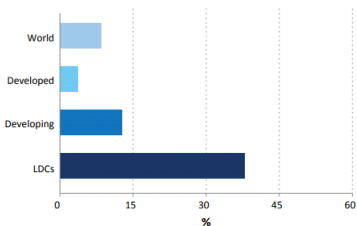
Source: ITU.
Note: *Estimates. CAGR refers to the compound annual growth rate.

Mobile-broadband subscriptions, 2017*



Acessos Fixos

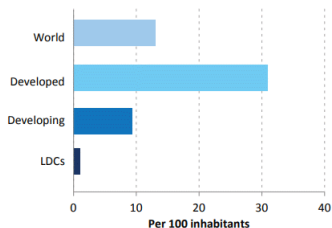
Growth of fixed-broadband subscriptions, CAGR, 2012-2017*



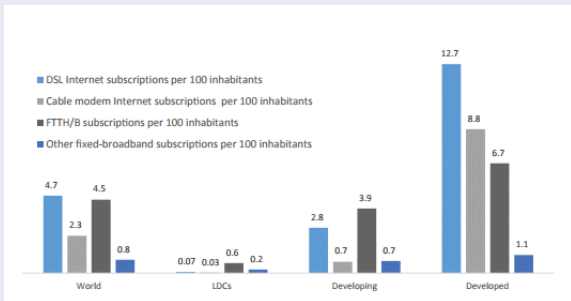
Source: ITU.

Note: *Estimates. CAGR refers to the compound annual growth rate.

Fixed-broadband subscriptions, 2017*



Tipos de Acessos Fixos



Tipos de Acesso

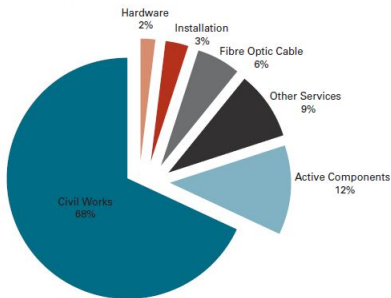
- HFC - Hybrid fibre-coaxial
- xDSL
 - ADSL - Asymmetric Digital Subscriber Line
 - HDSL - High Data Rate Digital Subscriber Line
- FTTX
 - FTTC - Fiber-to-the-cabinet ou Fiber-to-the-curb
 - FTTB - Fiber-to-the-building or Fiber-to-the-basement
 - FTTH - Fiber-to-the-home
 - FTTP - Fiber-to-the premises
- Wireless
 - 3G -4G -5G - WIMAX - Satélite - IoT

Características dos Tipos de Acesso

critérios tecnologia	Velocidade	Custo por bit	Perdas	Versatilidade	Capacidade	Confiabilidade	Continuidade
<u>FTTx</u>	☆☆☆	☆☆☆	☆☆☆	☆	☆☆☆	☆☆☆	☆☆☆
<u>xDSL</u>	☆☆☆	☆☆	☆☆☆	☆☆	☆☆☆	☆☆☆	☆☆☆
HFC	☆☆	☆☆☆	☆☆	☆☆	☆☆☆	☆☆	☆☆
<u>Wi-Fi</u>	☆☆	☆☆	☆☆	☆☆☆	☆☆	☆☆	☆☆
<u>WiMax</u>	☆☆	☆☆	☆☆	☆☆☆	☆☆	☆☆	☆☆
3G	☆☆	☆	☆☆	☆☆☆	☆☆	☆☆	☆☆
Satélite	☆	☆	☆	☆☆☆	☆	☆	☆
☆ Muito desfavorável	☆☆ Desfavorável	☆☆ Razoável	☆☆ Favorável	☆☆ Muito favorável			

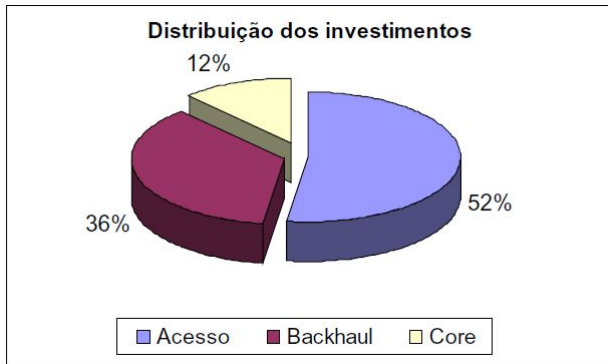
Custo de Implantação de Uma Rede

Metro Ethernet Implementation Costs in the First Year



Source: Corning and ETTX Council Europe

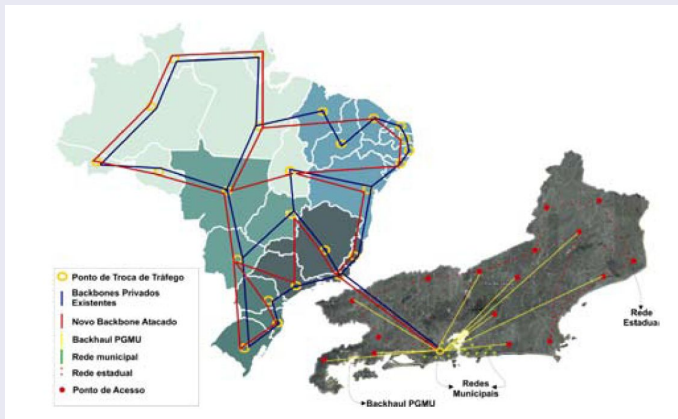
Investimentos - Rede Banda Larga



Nomenclatura de Redes

- LAN - Local Area Network
- MAN- Metro Area Network
- WAN- Wide Area Network
- Acesso (última milha)
- Transporte
 - Backhaul - Liga o equipamento da ponta ao backbone
 - Backbone / Core - interliga os principais pontos da rede.

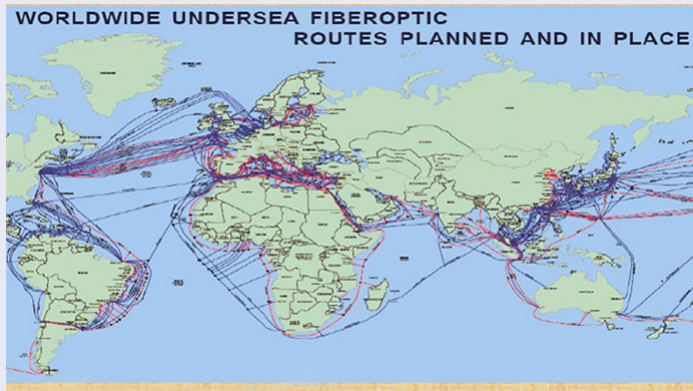
Backbone e Backhaul



Tipo de Infraestrutura

- Rádio Microondas (100/155 Mbps)
- Satélite
- Cabos Ópticos
 - OPGW - Optical Ground Wire
 - Submarino
 - Enterrado Dutos ou Diretamente Enterrado
 - Aéreo ou Autosustentado

Cabos Submarinos



Backhaul (Rede Elétrica)



Tecnologia do Backhaul

