Redes Domésticas

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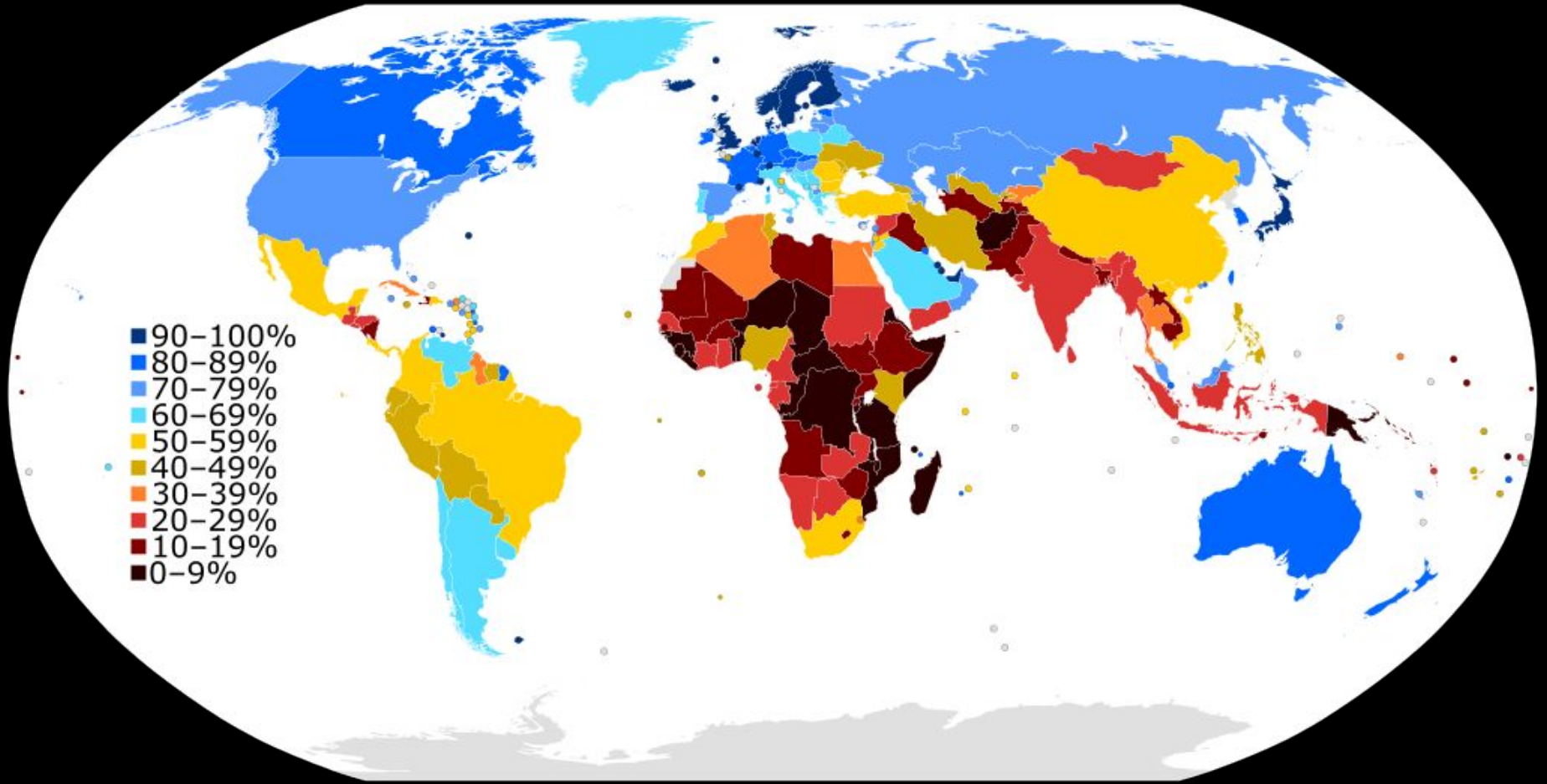
07/08/2017

Roteiro

- Nossa Conexão (Brasil)
- O que é uma rede doméstica
- Redes Locais - LAN
- Home Area Network - HAN
- Tecnologias Ethernet e Wifi
- WiFi x Wired
- Contratação de provedor de acesso
- Configuração da Rede
- Novas tecnologias


90–100%
80–89%
70–79%
60–69%
50–59%
40–49%
30–39%
20–29%
10–19%
0–9%

JAN 2017

INTERNET USE

BASED ON REPORTED ACTIVE INTERNET USER DATA, AND USER-CLAIMED MOBILE INTERNET USE

TOTAL NUMBER OF ACTIVE INTERNET USERS

139.1

MILLION

INTERNET USERS AS A PERCENTAGE OF THE TOTAL POPULATION

66%

TOTAL NUMBER OF ACTIVE MOBILE INTERNET USERS

131.6

MILLION

MOBILE INTERNET USERS AS A PERCENTAGE OF THE TOTAL POPULATION

63%

SOURCES: INTERNETWORLDSTATS; INTERNATIONAL TELECOMMUNICATION UNION (ITU); INTERNETLIVESTATS; CIA WORLD FACTBOOK; FACEBOOK; NATIONAL REGULATORY AUTHORITIES; GLOBALWEBINDEX, Q3 & Q4 2016. **NOTE:** GLOBALWEBINDEX DATA IS BASED ON A SURVEY OF INTERNET USERS AGED 16-64, BUT DATA HAS BEEN REBASED TO SHOW TOTAL NATIONAL PENETRATION. PENETRATION FIGURES BASED ON POPULATION DATA FROM THE UNITED NATIONS AND THE U.S. CENSUS BUREAU.

Country or area	Internet users	Rank	Percentage	Rank
China	692,152,618	1	50.30%	90
India	340,873,137	2	26.00%	127
United States	239,882,242	3	74.55%	40
Brazil	122,796,320	4	59.08%	71
Japan	118,131,030	5	93.33%	9
Russia	105,311,724	6	73.41%	43
Nigeria	86,436,611	7	47.44%	96
Iceland	323,495	155	98.20%	1

Rank	Country/Territory	connection speed (Mb/s)[2]	Relative speed
-	*Global*	5.6	
1	South Korea	26.7	
2	Sweden	19.1	
3	Norway	18.8	
4	Japan	17.4	
5	Netherlands	17.0	
6	Hong Kong	16.8	
7	Latvia	16.7	
8	Switzerland	16.7	
9	Finland	16.6	
10	Denmark	16.1	

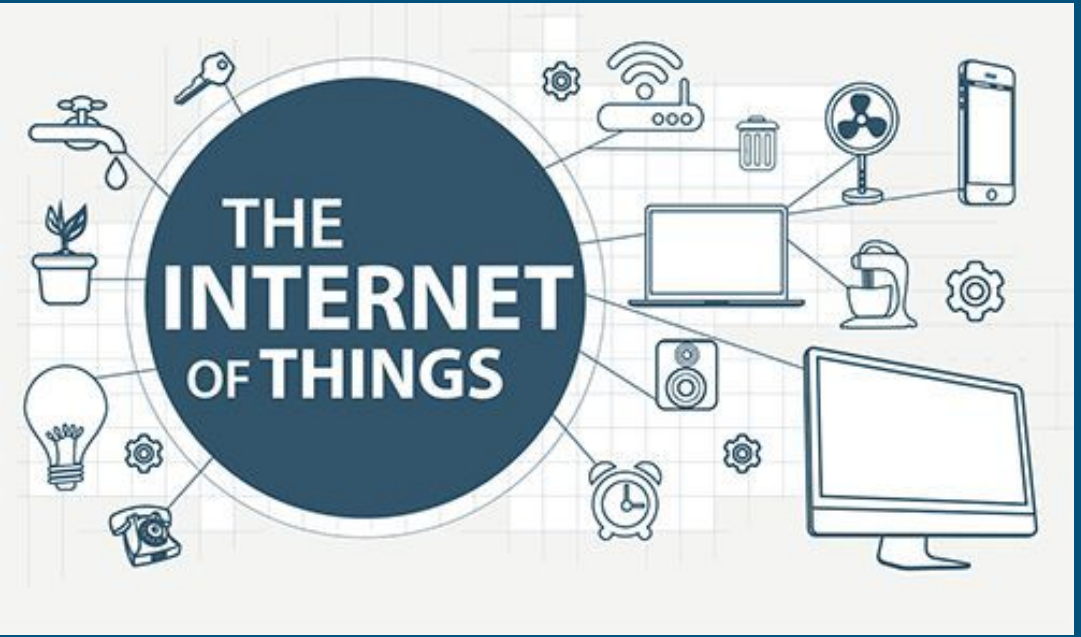
LAN - Local Area Network

- É uma rede de computadores com alcance limitado
- Ethernet (IEEE 802.3)
  - Predominou sobre Token Ring e FDDI
  - 1983, cabo coaxial, 10 Mbit/s
  - Par trançado
  - Fibra ótica, até 100 Gbit/s
- Compartilhamento de recursos
  - Acesso a Internet
  - Impressora
  - Sistemas de arquivos
  - Etc.
- Wired ou Wireless

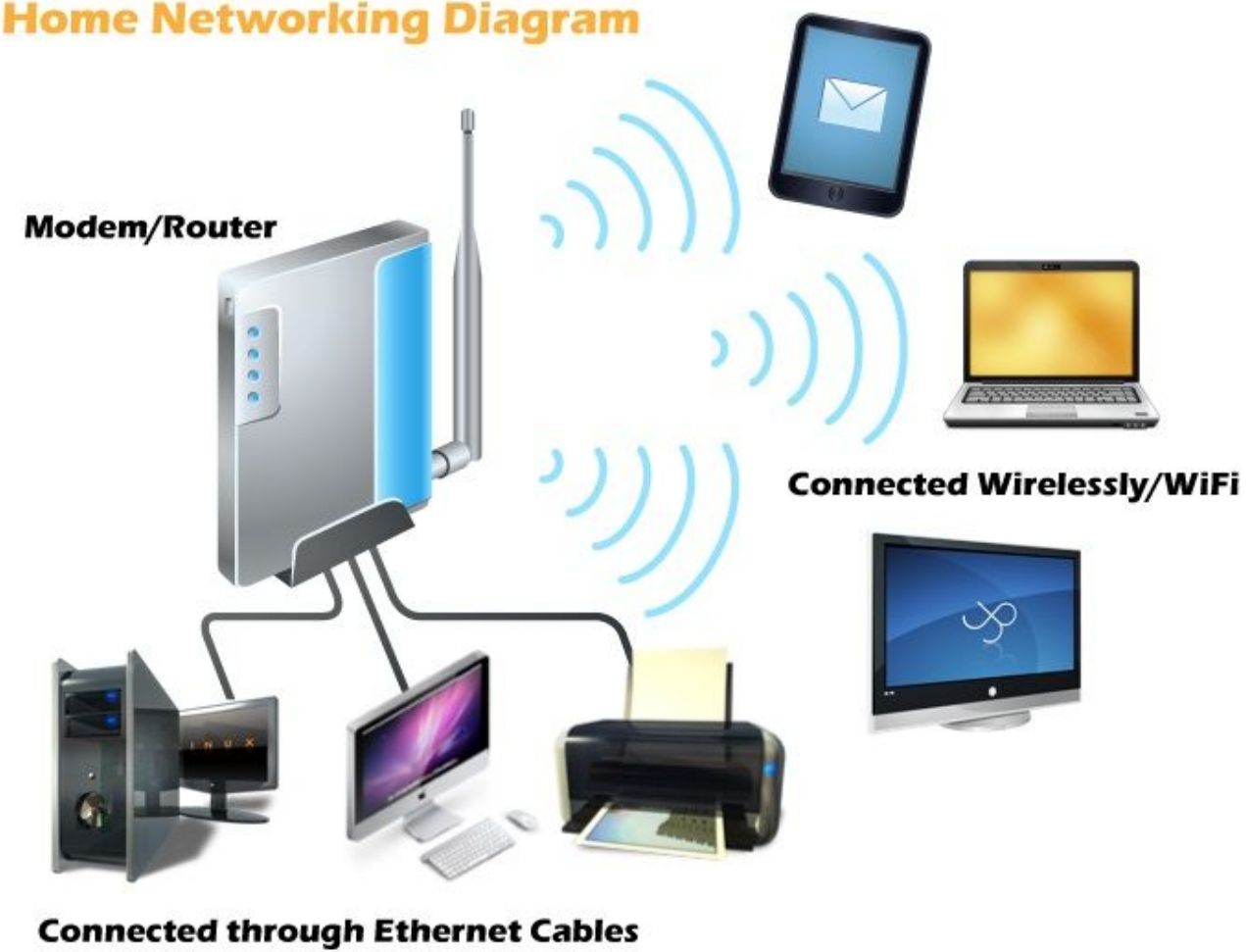
HAN - Home Area Network

- É uma rede local para compartilhamento de recursos dentro dos limites de uma residência ou Home Office
- Computadores, impressoras, arquivos
- Smartphones, tablets
- console de Jogos, TV, Som, IoT
- Tecnologias de LAN

LAN → HAN → Smart Home

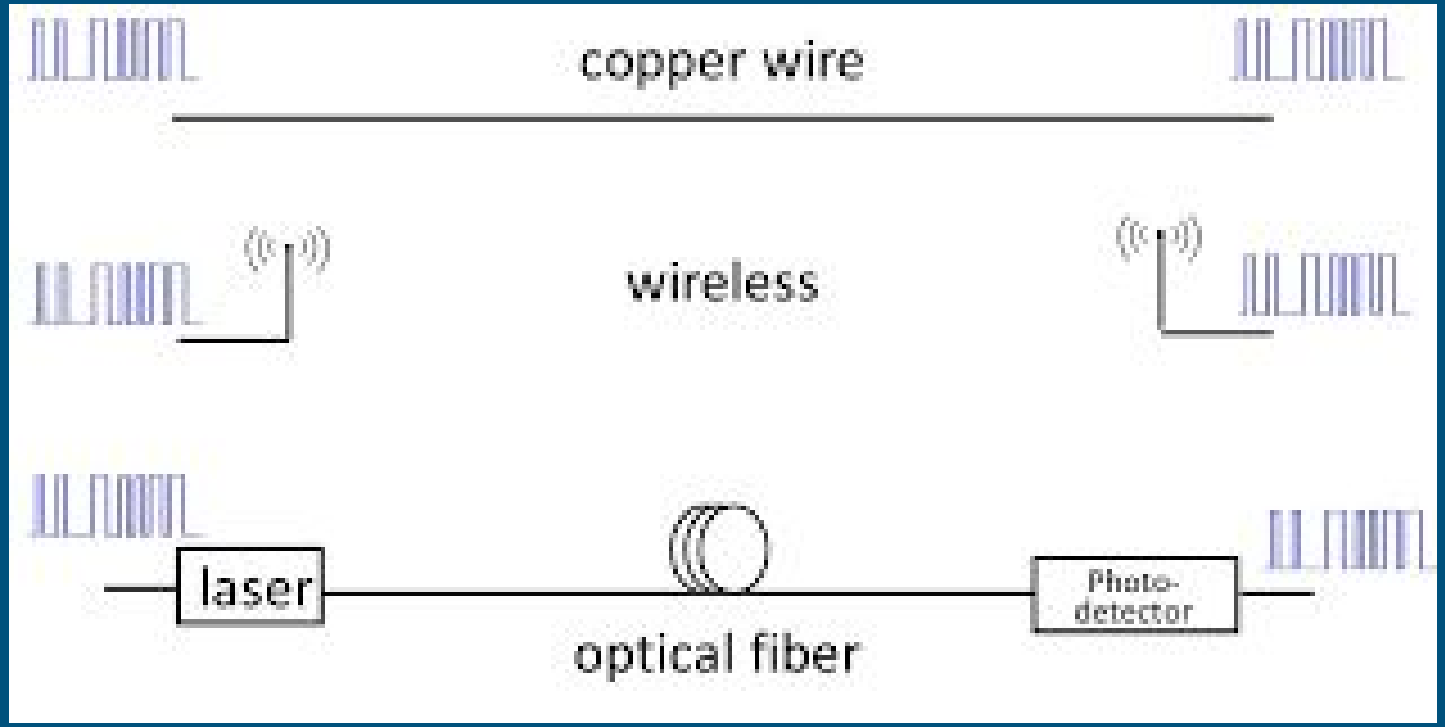


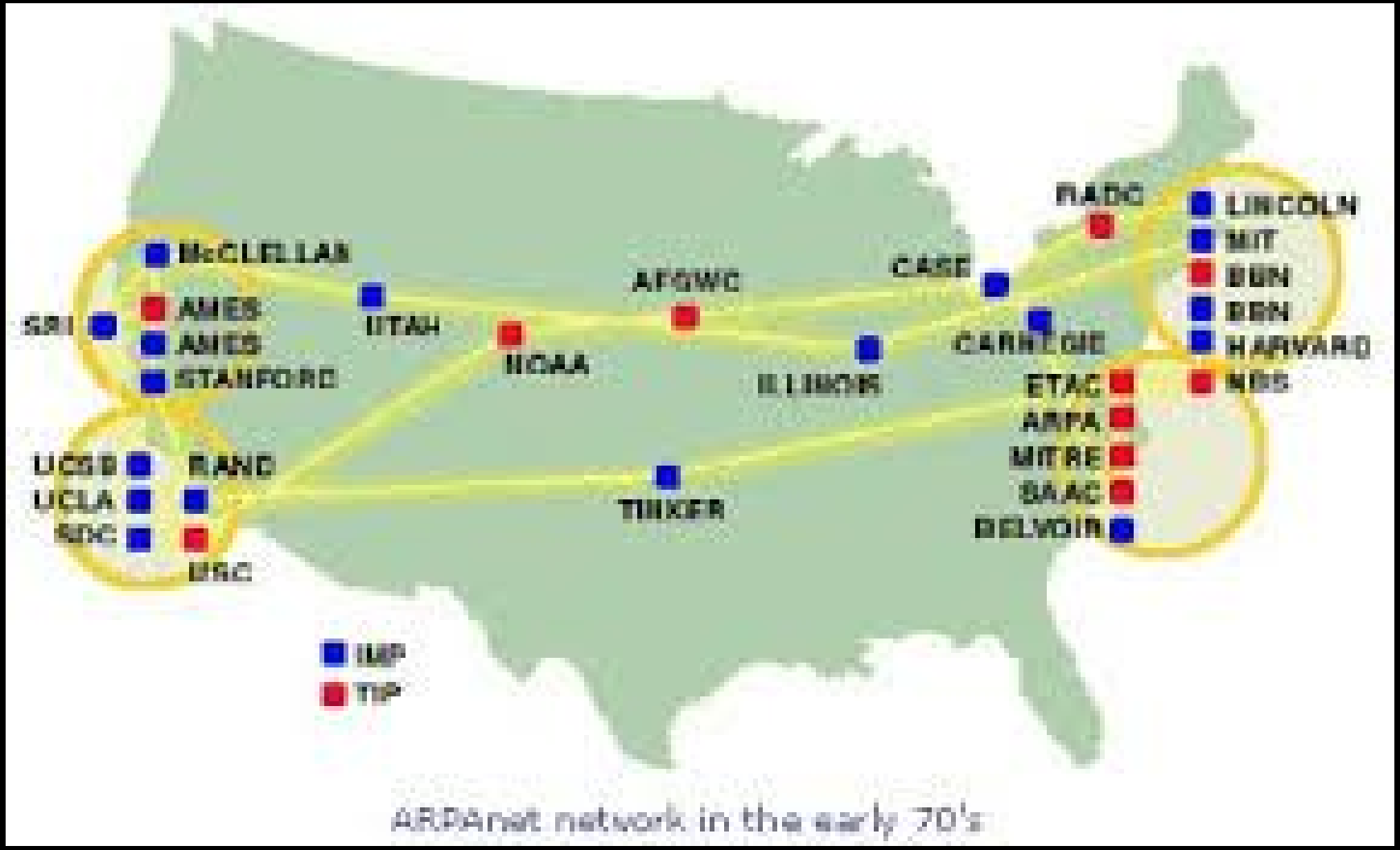
Home Networking Diagram



Modem, Roteador, Switch e Wireless

Meio de Transmissão

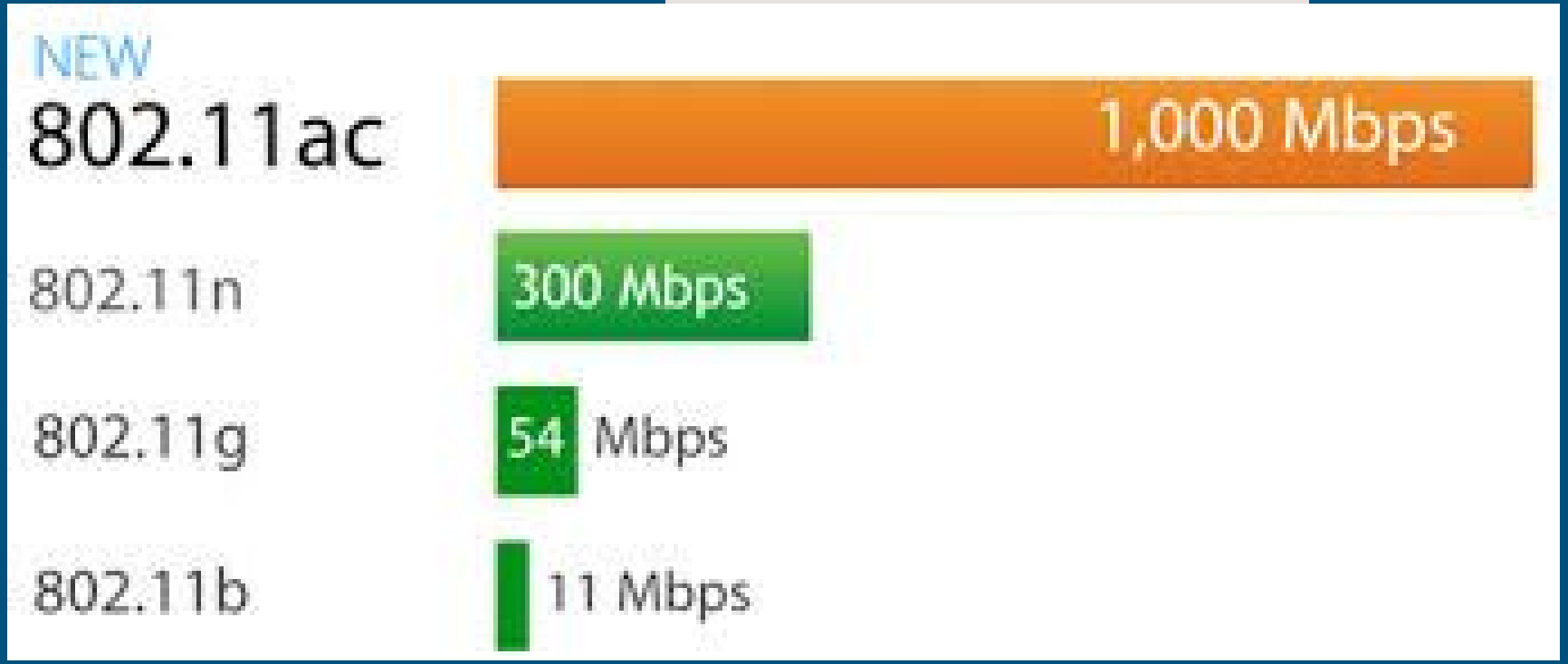




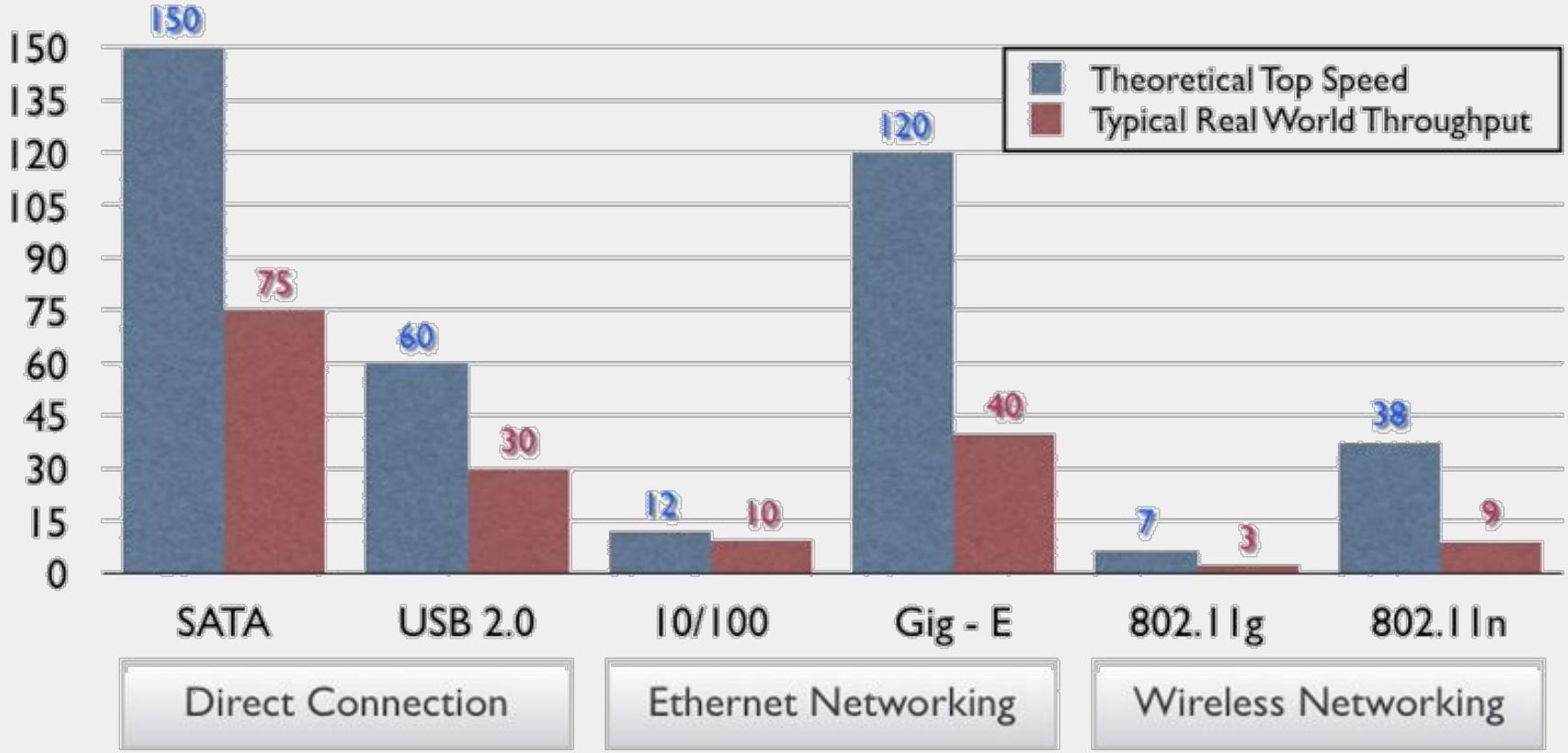
ARPAnet network in the early 70's

https://www.youtube.com/watch?v=IlAJJI-qG2k

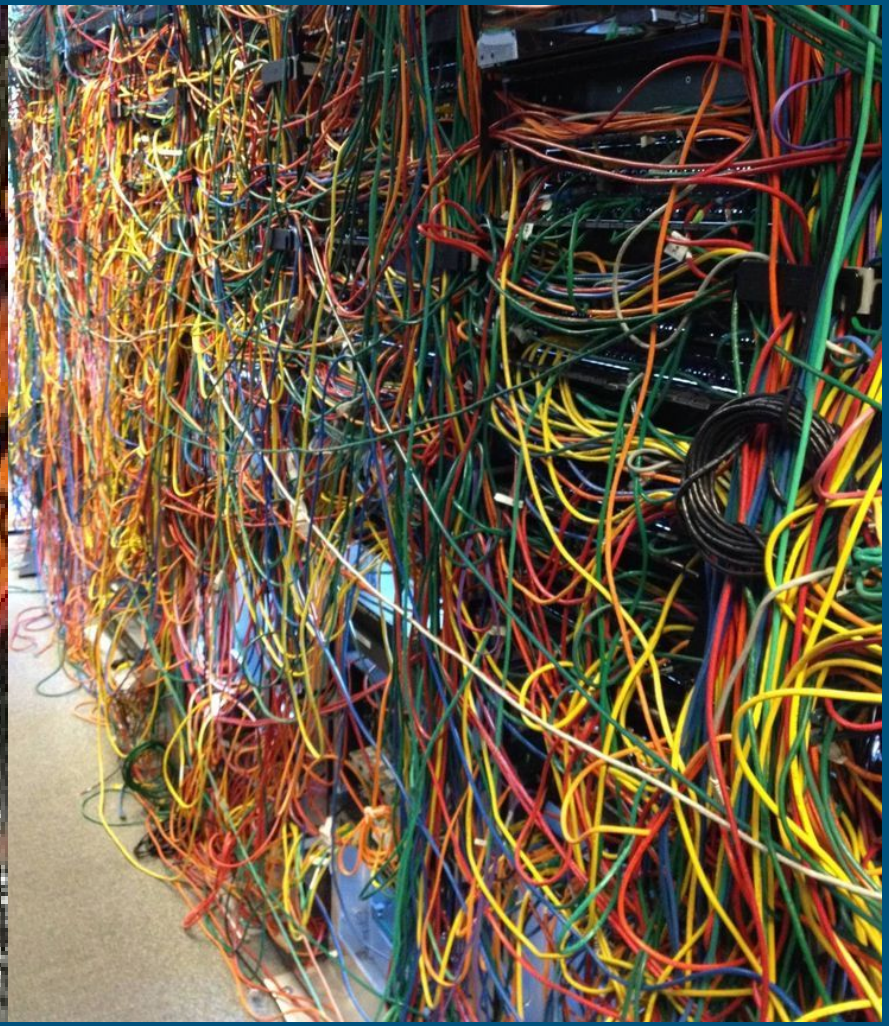
Wired X Wireless

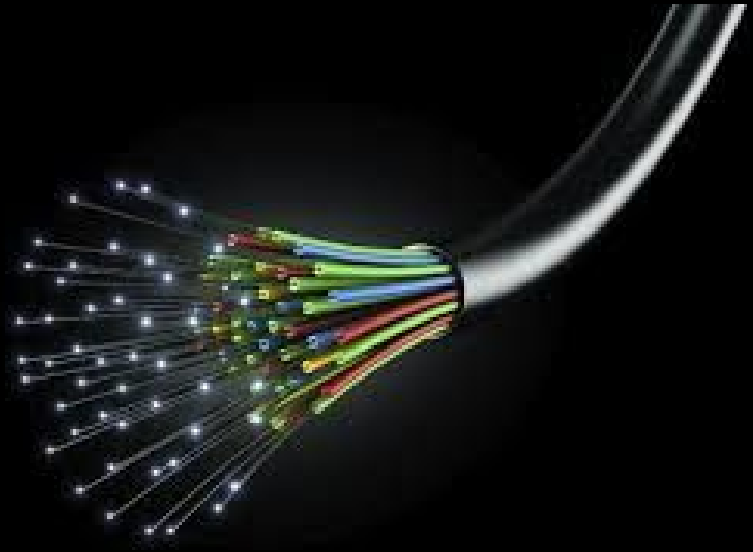


Data Rate Comparisons, in MB/sec

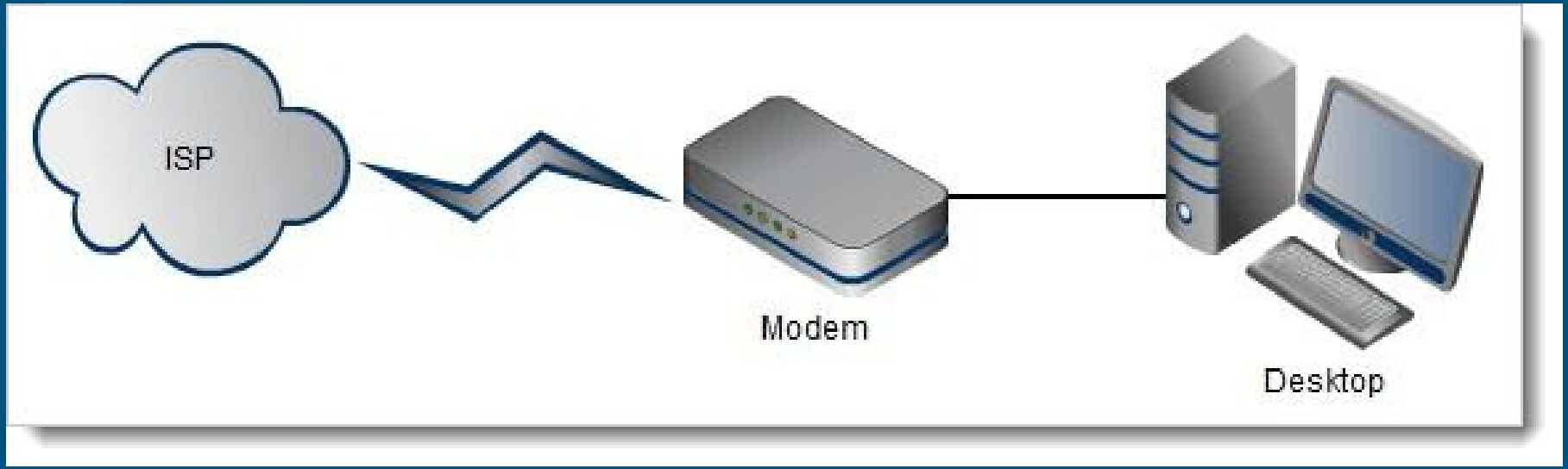


http://appleinsider.com/articles/08/03/28/exploring_time_capsule_theoretical_speed_vs_practical_throughput.html





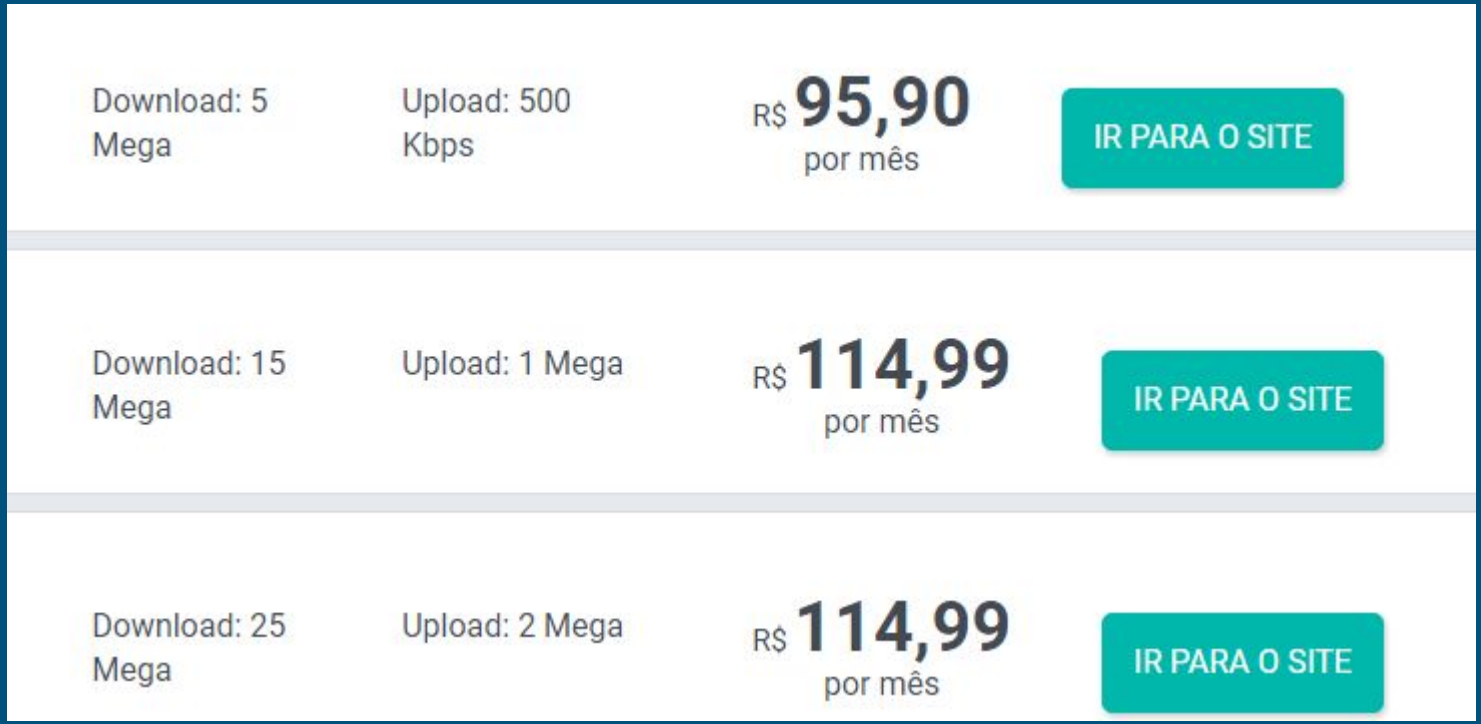
Provedor de Acesso



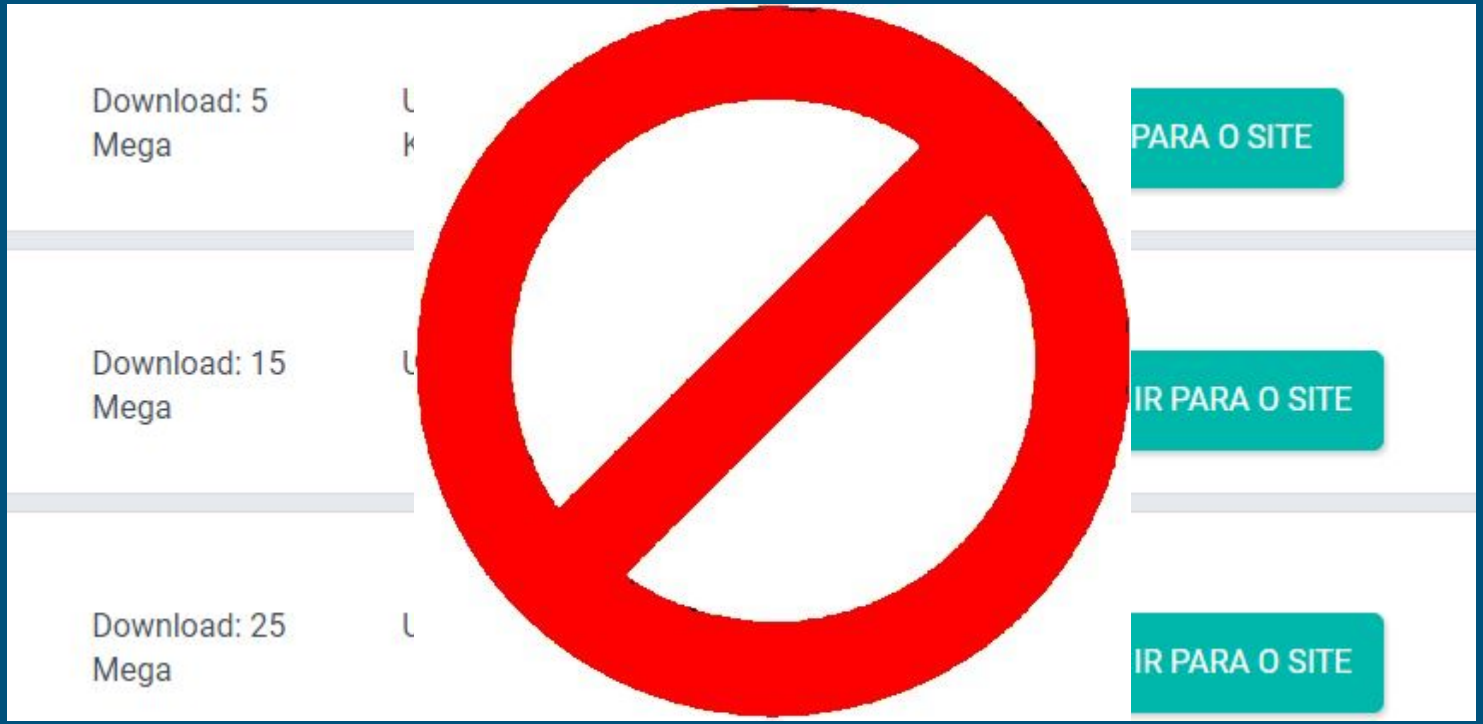
Escolha do Provedor

1. Disponibilidades
2. Comparativos
3. Levantamento das Necessidades
4. Escolha e contratação

Escolha da Operadora



Escolha da Operadora



Ranking Minha Conexão

1º - **Net Virtua:** 27.6 Mbps
2º - **Vivo:** 17.3 Mbps
3º - **Gvt:** 16.9 Mbps
4º - **Omni Telecom:** 12.5 Mbps
5º - **Ctbc:** 12.0 Mbps
6º - **Explorernet:** 8.5 Mbps
7º - **Wgo:** 6.9 Mbps
8º - **Velox:** 6.6 Mbps
9º - **Telgo:** 6.2 Mbps
10º - **Radar:** 5.7 Mbps

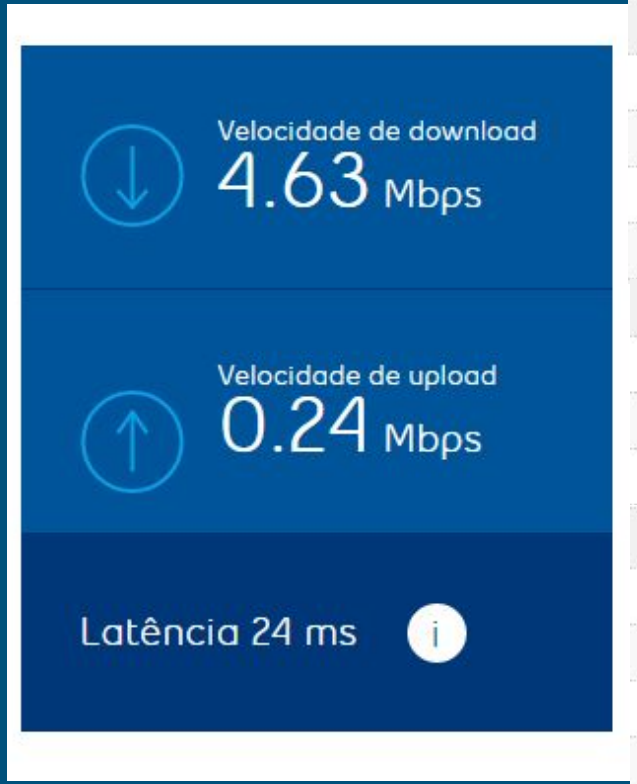
Teste da Velocidade

- Usar mais de um medidor
- Configurar servidores diferentes
- Entender a metodologia de cada medidor
- De preferência só o medidor executando
  - Apenas um de cada vez!
- Mesmas condições
  - Baixando vídeo ou não!
- Armazenar histórico de medições
- Analisar as medições

Minha Conexão

Velocidade Download	Velocidade Upload	Ping	Servidor de testes	Local do Servidor
5.11 Mbps	0.48 Mbps	23 ms	PC2 Telecom	Jaraguá
4.95 Mbps	0.53 Mbps	32 ms	PC2 Telecom	Jaraguá
3.44 Mbps	0.57 Mbps	223 ms	Spark	Wellington
5 Mbps	0.36 Mbps	49 ms	G8	Goiânia
5.18 Mbps	0.49 Mbps	22 ms	GSCD Telemont RGO	Goiânia
5.12 Mbps	0.5 Mbps	48 ms	ei telecom	Goiania
4.77 Mbps	0.57 Mbps	35 ms	MinhaConexao	Sao Paulo
5.01 Mbps	0.5 Mbps	23 ms	GSCD Telemont RGO	Goiânia
4.93 Mbps	0.44 Mbps	21 ms	GSCD Telemont RGO	Goiânia

Brasil Banda Larga

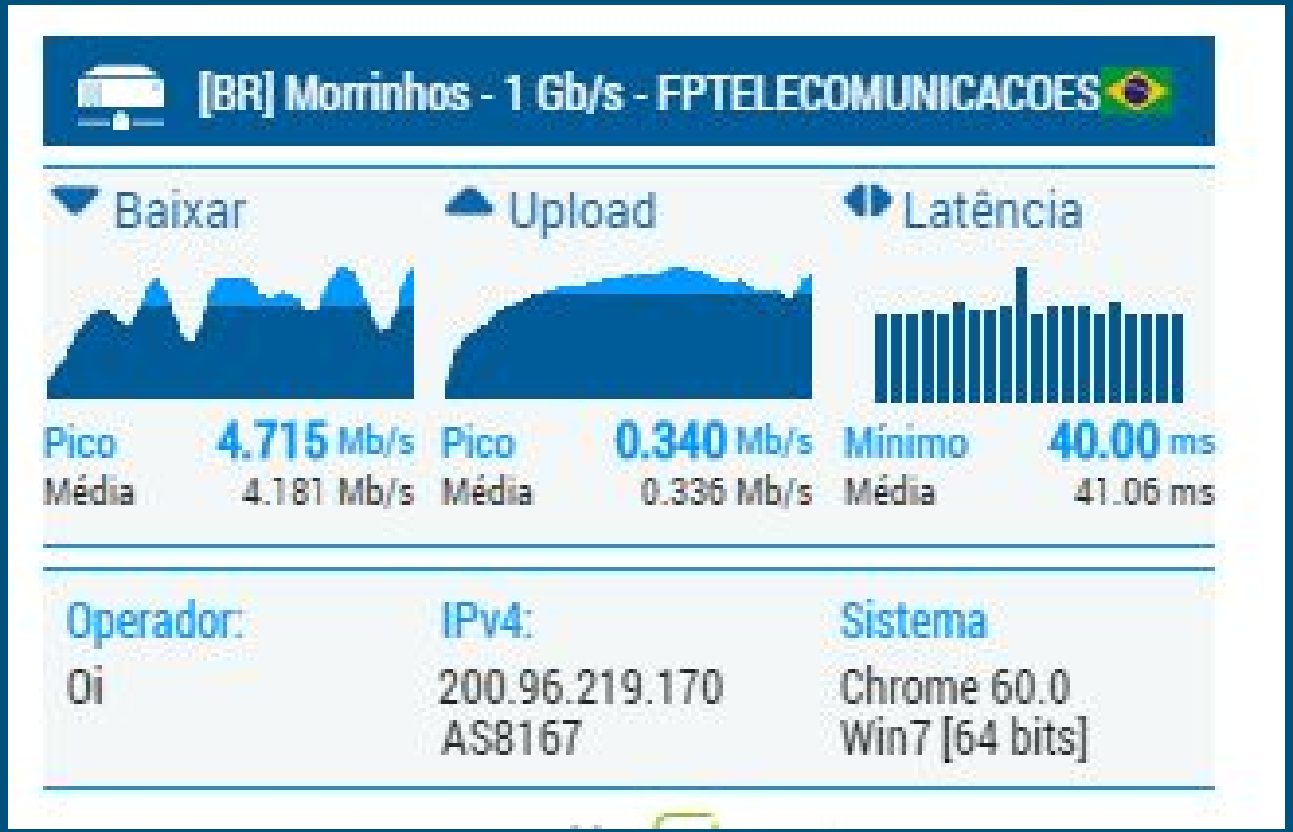


Velocidade (Mbps)
4.63
3.05
4.52
4.71

Velocidade (Mbps)
0.24
0.36
0.44

Media (ms)
24
25
28
25

TecMundo


[BR] Morrinhos - 1 Gb/s - FPTELECOMUNICACOES
Baixar
Upload
Latência
Pico 4.715 Mb/s
Média 4.181 Mb/s
Pico 0.340 Mb/s
Média 0.336 Mb/s
Mínimo 40.00 ms
Média 41.06 ms
Operador:
Oi
IPv4:
200.96.219.170
AS8167
Sistema
Chrome 60.0
Win7 [64 bits]

Teste da Velocidade: Problemas!

- Você não tem a conexão!
- E agora...
- Se for conexão móvel
  - Convidar um amigo com Vivo, outro com Tim, …
  - Fazer algumas medições
- Banda larga
- Analisar estudos e rankings
- Sites de reclamações

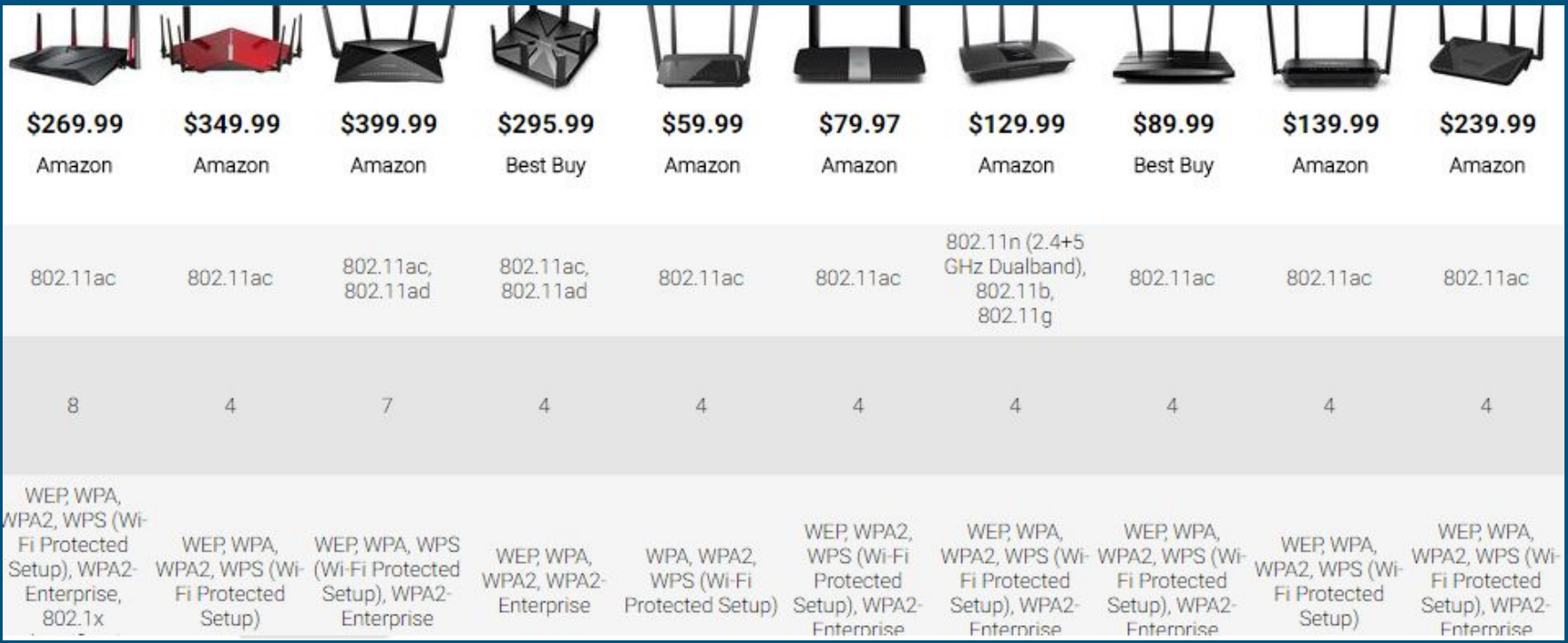
Escolha do roteador

- Modem, gateway, switch, roteador wireless, etc
- Single- or Dual-Band?
  - 2.4GHz
  - 2.4GHz e 5.0 GHz
- Protocolo Wireless 802.11
  - Mais antigos
    - 802.11b
    - 802.11g
  - Mais moderno
    - 802.11n
    - 802.11ac

Recursos

- Parental control
- Rede Wi-Fi para convidados
- Single (2.4 GHz) ou Dual Band (5.0 GHz)
- Wi-Fi 11AC - Até 600 Mbps (2.4GHz) + 1300 Mbps (5GHz)
- Segurança
  - Wired Equivalent Privacy (WEP) antigo
  - WPA usa TKIP (Temporal Key Integrity Protocol)
  - WPA2 desde 2006, capaz de usar AES
- WPS - Wi-Fi Protected Setup

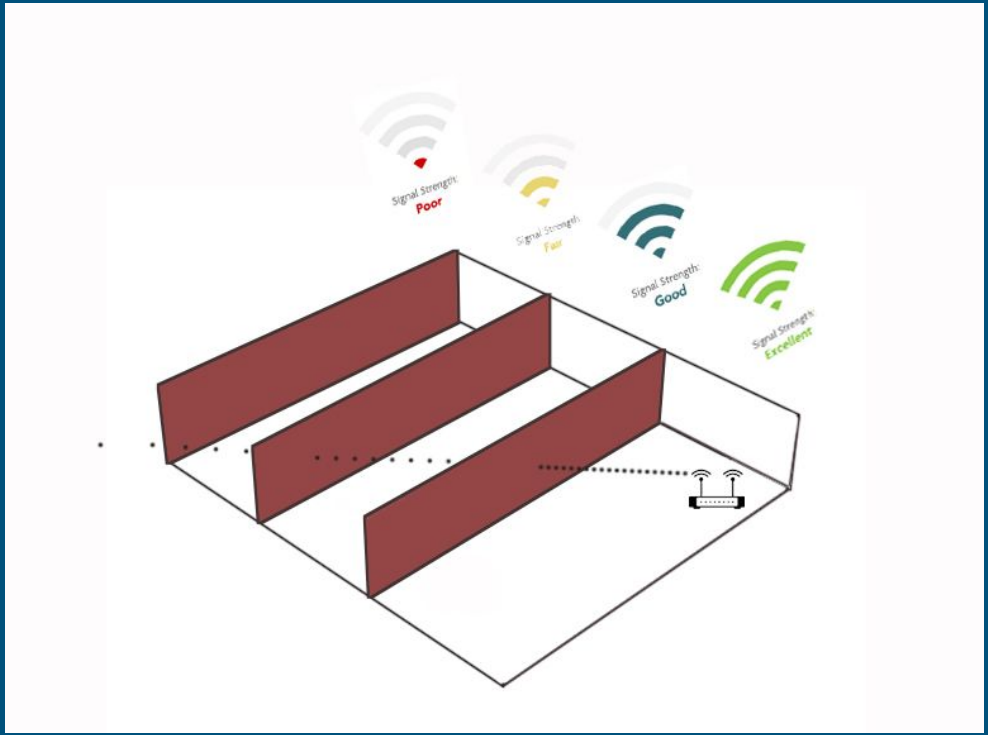
Revisão de Roteadores Tradicionais

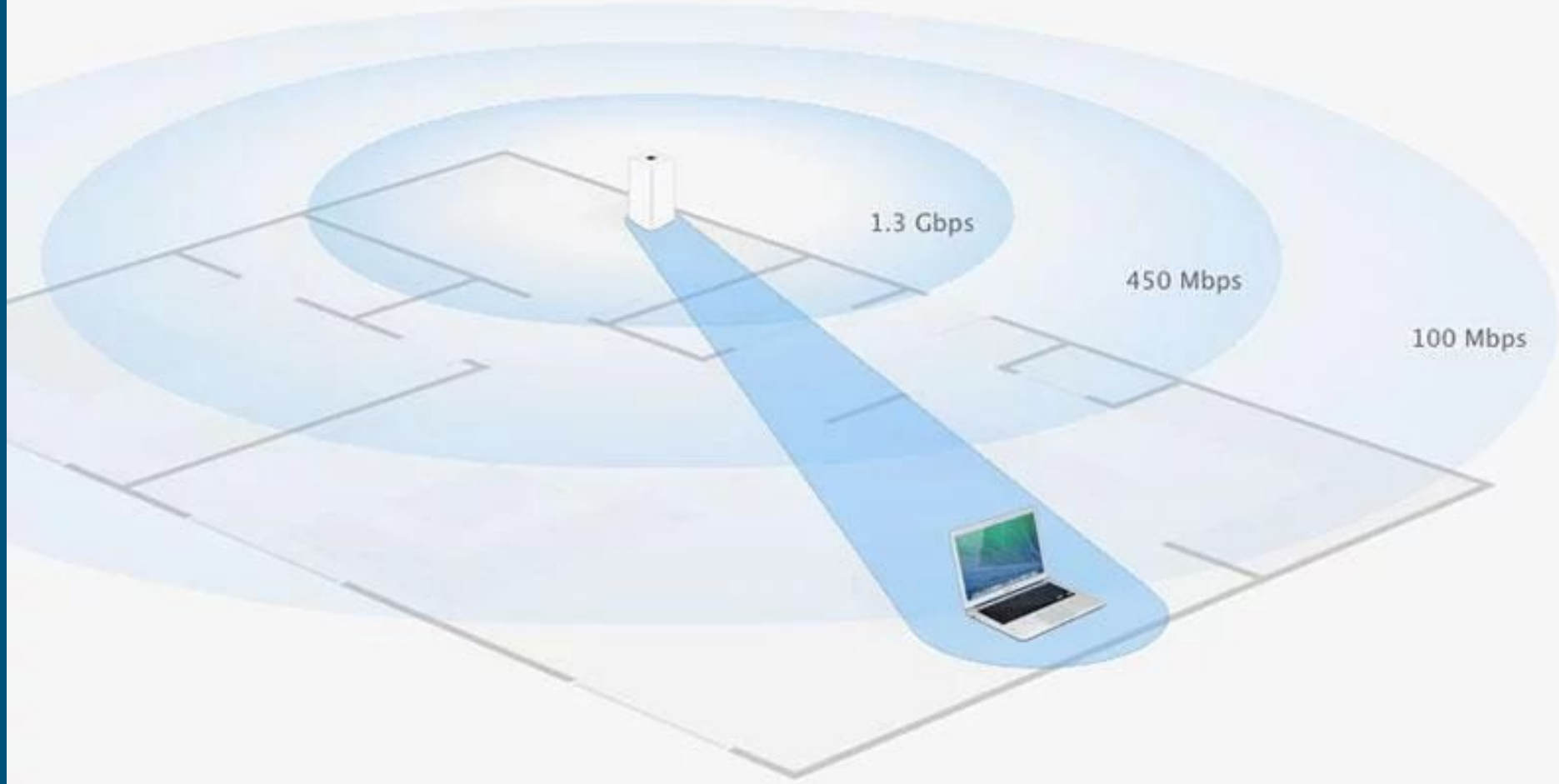


$269.99 Amazon	$349.99 Amazon	$399.99 Amazon	$295.99 Best Buy	$59.99 Amazon	$79.97 Amazon	$129.99 Amazon	$89.99 Best Buy	$139.99 Amazon	$239.99 Amazon
802.11ac	802.11ac	802.11ac, 802.11ad	802.11ac, 802.11ad	802.11ac	802.11ac	802.11n (2.4+5 GHz Dualband), 802.11b, 802.11g	802.11ac	802.11ac	802.11ac
8	4	7	4	4	4	4	4	4	4
WEP, WPA, WPA2, WPS (Wi-Fi Protected Setup), WPA2-Enterprise, 802.1x	WEP, WPA, WPA2, WPS (Wi-Fi Protected Setup)	WEP, WPA, WPS (Wi-Fi Protected Setup), WPA2-Enterprise	WEP, WPA, WPA2, WPA2-Enterprise	WPA, WPA2, WPS (Wi-Fi Protected Setup)	WEP, WPA2, WPS (Wi-Fi Protected Setup), WPA2-Enterprise	WEP, WPA, WPA2, WPS (Wi-Fi Protected Setup), WPA2-Enterprise	WEP, WPA, WPA2, WPS (Wi-Fi Protected Setup), WPA2-Enterprise	WEP, WPA, WPA2, WPS (Wi-Fi Protected Setup)	WEP, WPA, WPA2, WPS (Wi-Fi Protected Setup), WPA2-Enterprise

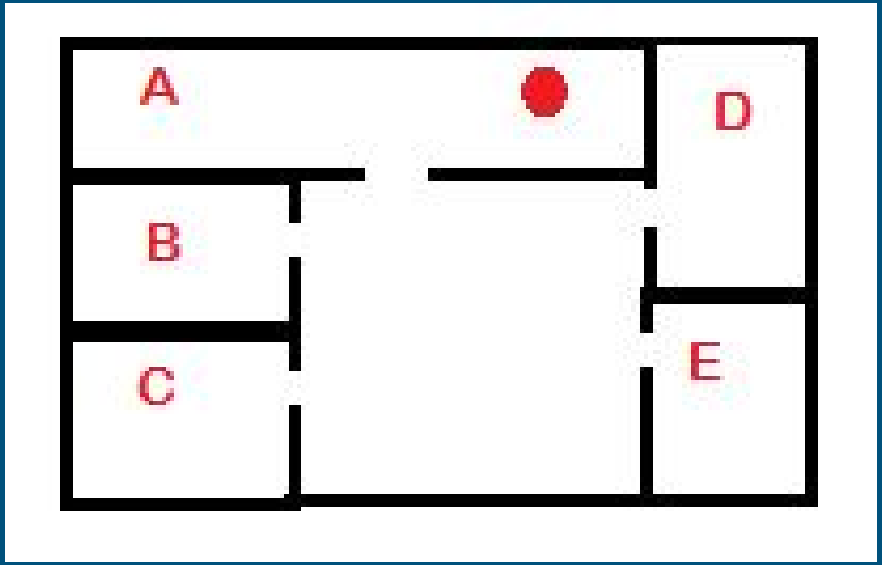
https://www.pcmag.com/article2/0,2817,2398080,00.asp

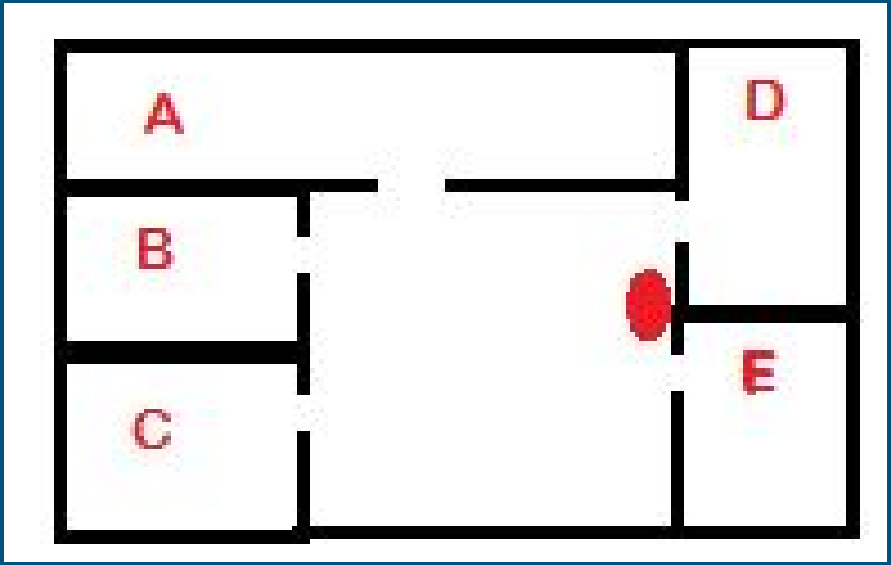
Instalação


Signal Strength:
Poor
Signal Strength:
Fair
Signal Strength:
Good
Signal Strength:
Excellent

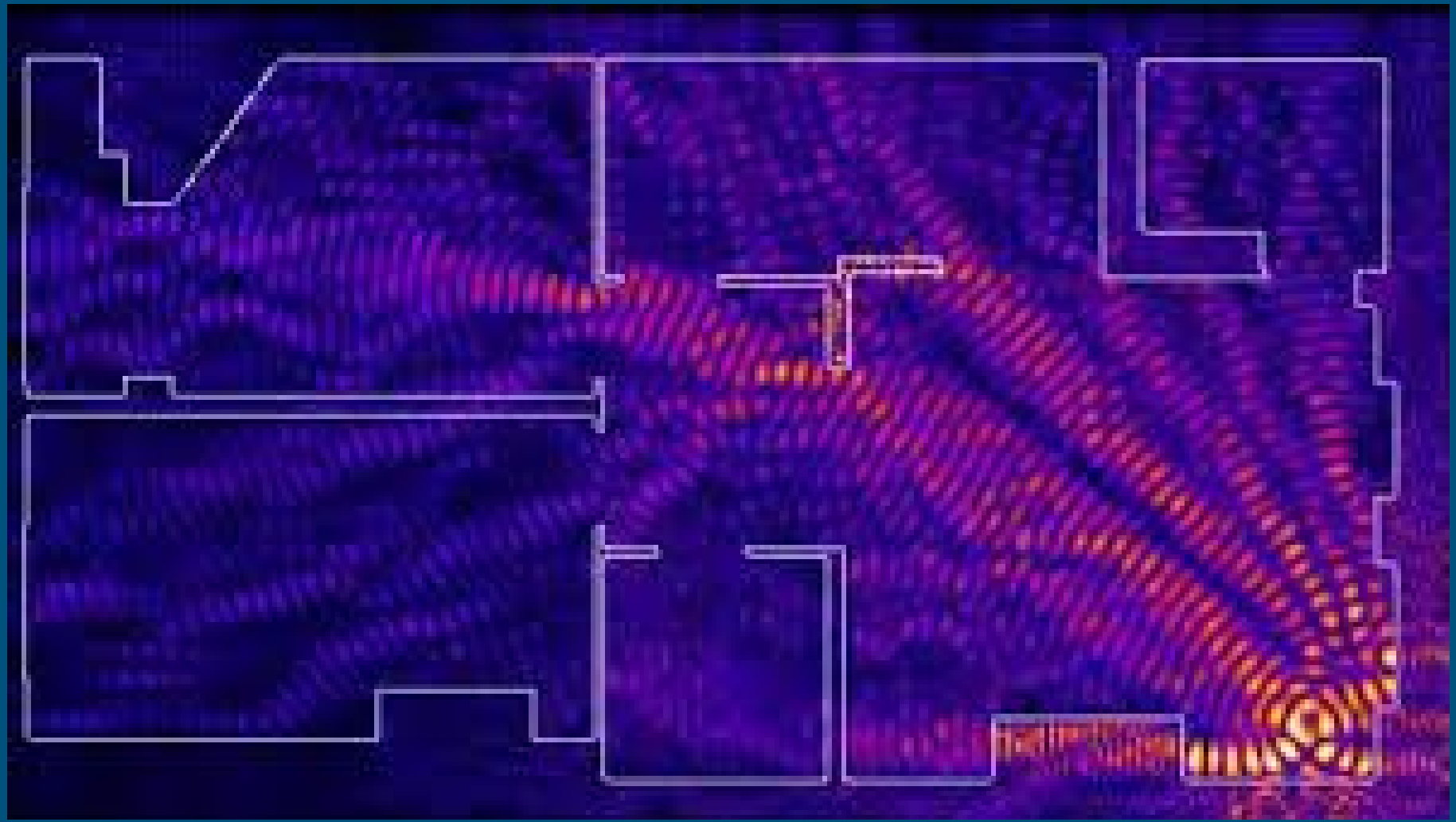

1.3 Gbps
450 Mbps
100 Mbps

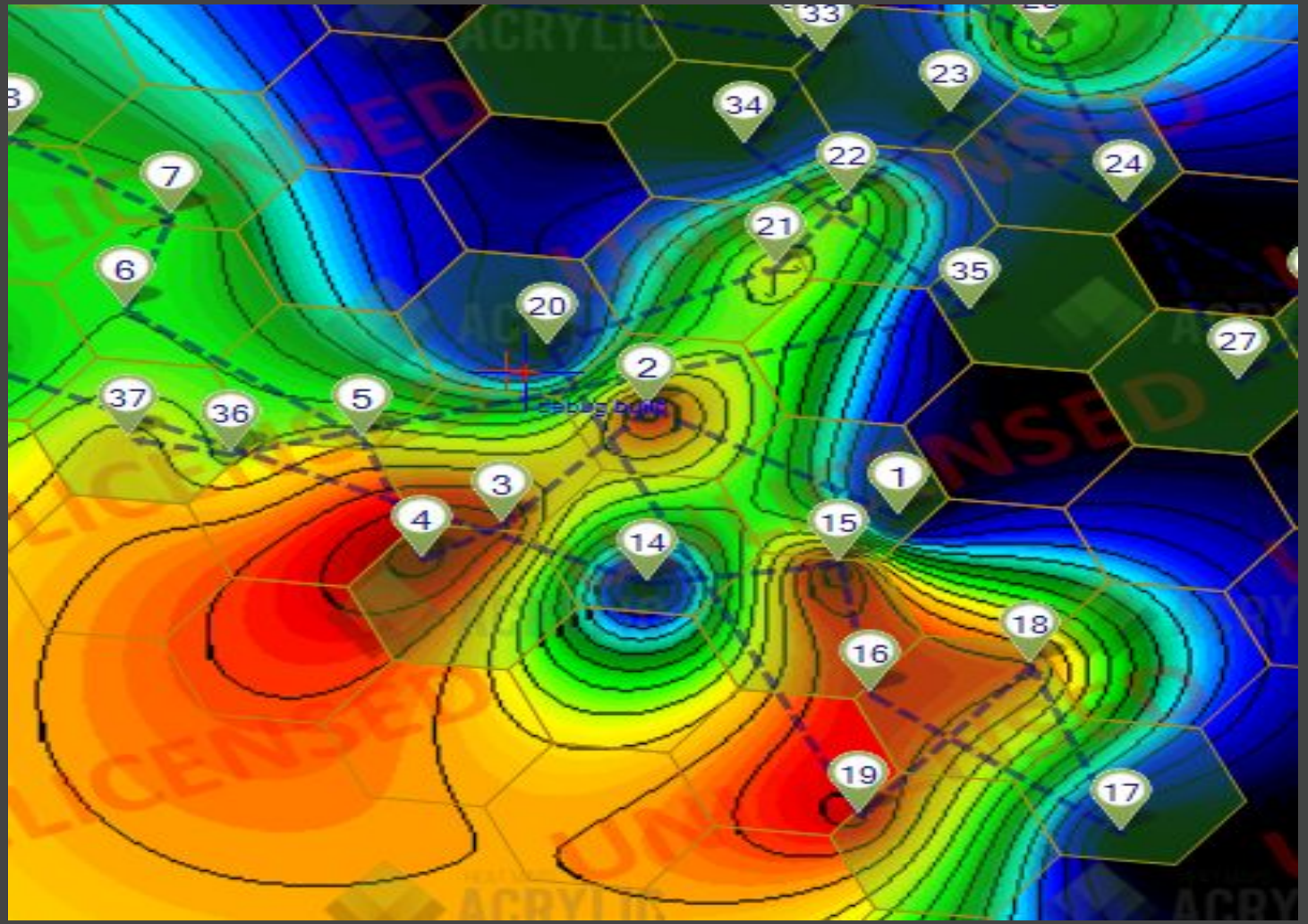
Localização do Roteador





Construindo Heat Map




33
23
34
22
24
7
21
6
35
20
27
2
37
36
5
1
3
4
15
14
18
16
19
17

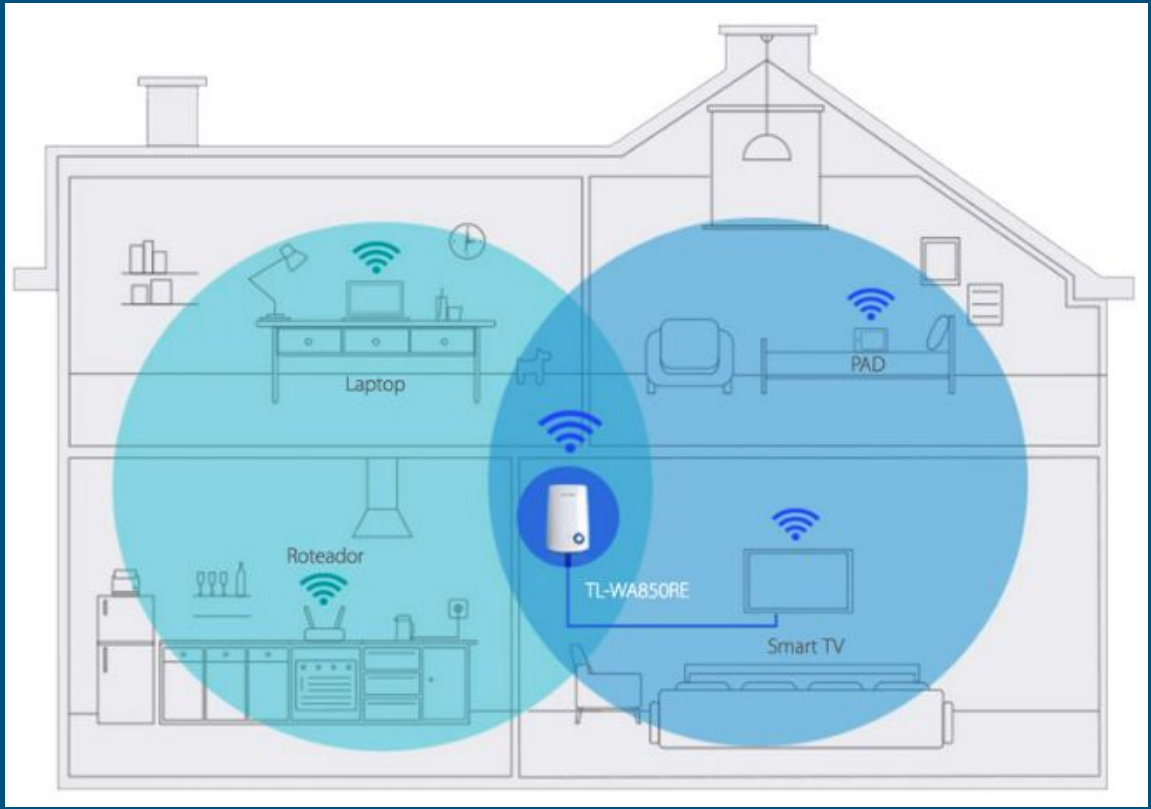
Como Tentar Melhorar o Sinal WiFi

1. Atualizar firmware
2. Monitorar equipamentos conectados
3. Interferência de WiFi vizinho, eletrônicos, rede elétrica
4. Reposicionar o roteador
5. Aumentar a potência do sinal de transmissão
6. Mudar o Canal de operação
7.
8. Trocar equipamento por um mais moderno
9. Instalar repetidor
10. Instalar Extender
11. Mudar para Mesh WiFi

Dicas de Segurança

1. Atualizar firmware
2. Trocar senha do Admin
3. Trocar senha de acesso WiFi
4. Monitorar equipamentos conectados
5. Usar WPA2 e AES
6. Evitar WPS (Wi-Fi Protected Setup)
7. Não propagar Id da rede (SSID - Service Set ID)
8. Controlar acesso via MAC (Media Access Control) Address
9. Evitar passar senha para visitantes
10. Separar visitantes dos recursos da rede

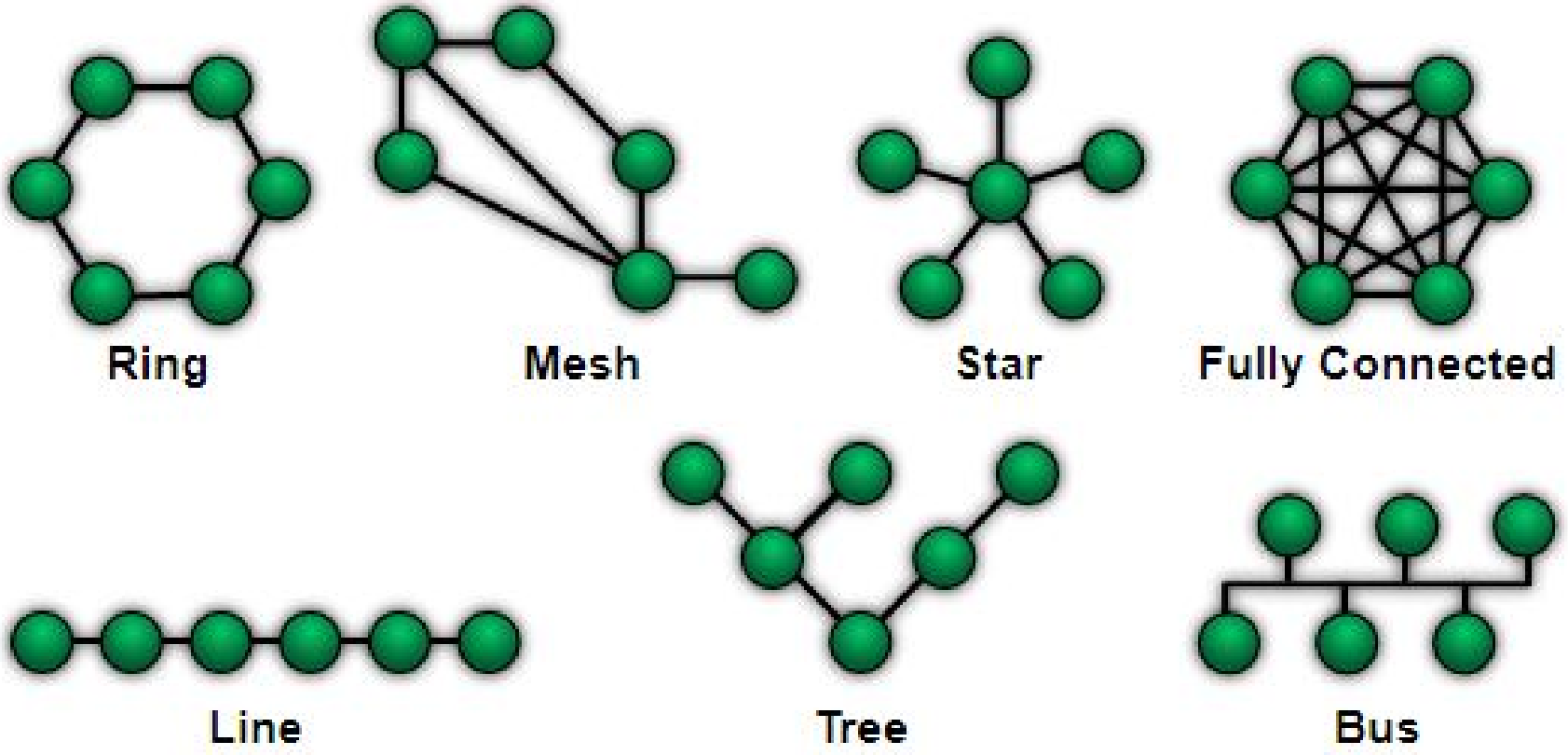
WI-FI: pontos sem sinal

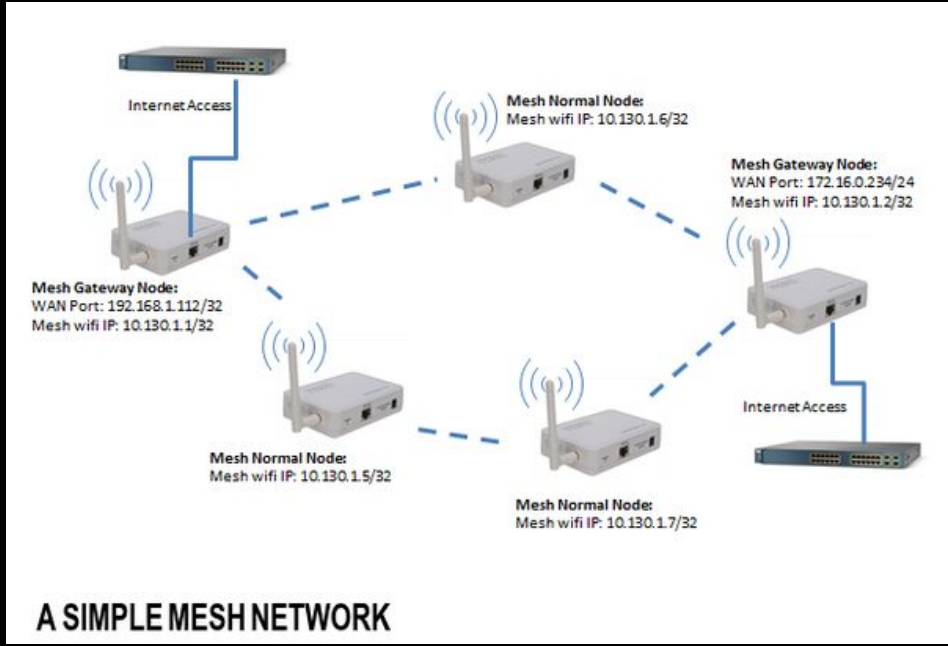


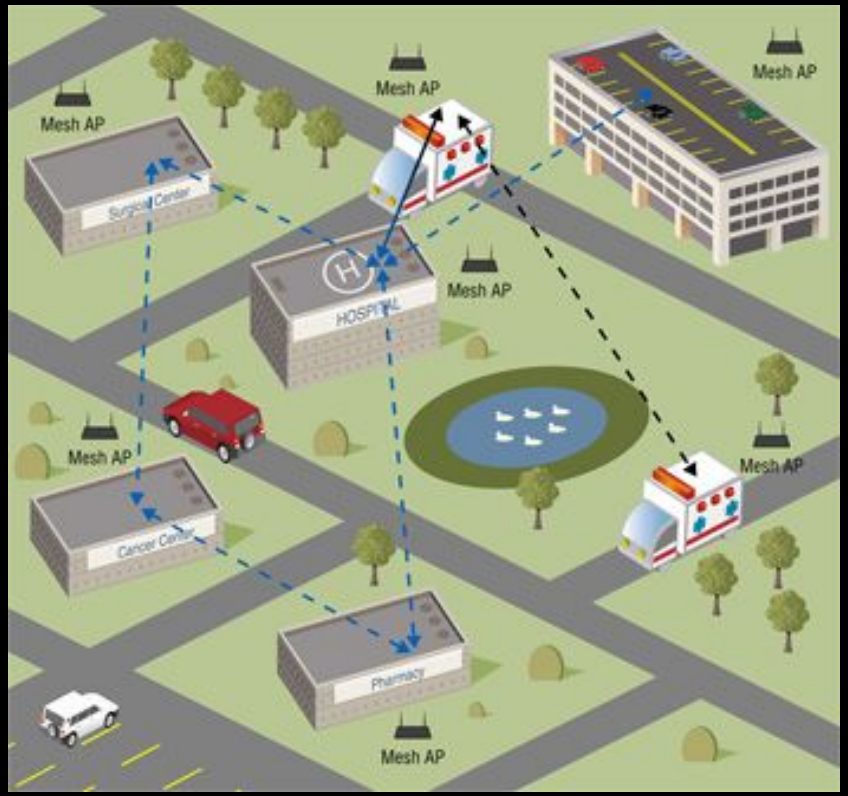
Repetidores

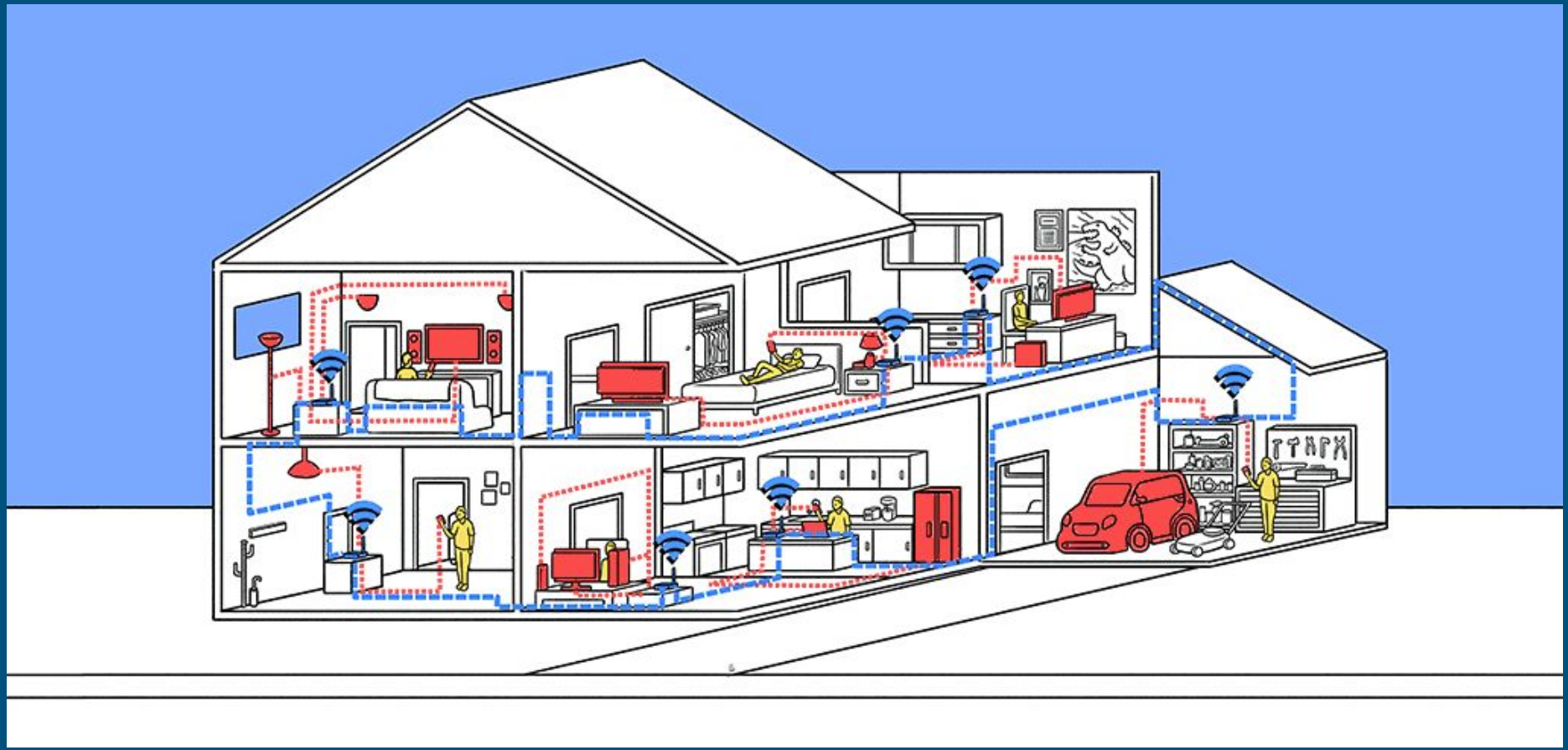
Mesh WiFi Network

- Wireless Mesh Network (WMN)
- Mesh=Tela, malha, trama
- Rede WiFi em que os elementos cooperam na distribuição dos dados dentro da rede


Ring
Mesh
Star
Fully Connected
Line
Tree
Bus


Internet Access
Mesh Normal Node:
Mesh wifi IP: 10.130.1.6/32
Mesh Gateway Node:
WAN Port: 172.16.0.234/24
Mesh wifi IP: 10.130.1.2/32
Mesh Gateway Node:
WAN Port: 192.168.1.112/32
Mesh wifi IP: 10.130.1.1/32
Internet Access
Mesh Normal Node:
Mesh wifi IP: 10.130.1.5/32
Mesh Normal Node:
Mesh wifi IP: 10.130.1.7/32
A SIMPLE MESH NETWORK


Mesh AP
Mesh AP
Mesh AP
Mesh AP
Mesh AP
Mesh AP
Mesh AP
Surgical Center
HOSPITAL
Cancer Center
Pharmacy



Mesh Wi-Fi

Glossário

- GigE - Gigabit Ethernet pu GbE
- FDDI - Fiber Distributed Data Interface
- WAN - Wide Area Network
- PPPoE - Point-to-Point Protocol over Ethernet
- LAN - Local Area Network
- DHCP - Dynamic Host Configuration Protocol (IP dinâmico)
- WLAN - Wireless Local Area Network
- ADSL - Asymmetric Digital Subscriber Line
- WI-FI - Wireless Fidelity (IEEE 802.11)
- MAC - Media Access Control
- WEP - Wired Equivalent Privacy
- WPA- Wi-Fi Protected Access
- WPA2 - Wi-Fi Protected Access Version 2
- PSK - Pre-Shared Key
- AES - Advanced Encryption Standard
- TKIP - Temporal Key Integrity Protocol
- WPS - WiFi Protected Setup