



Тренды в технологиях последней мили

22-24 МАЙ 2019

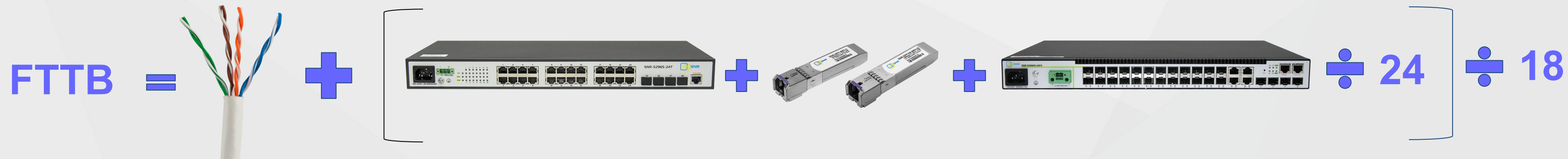
Михаил Бурнин
НАГ

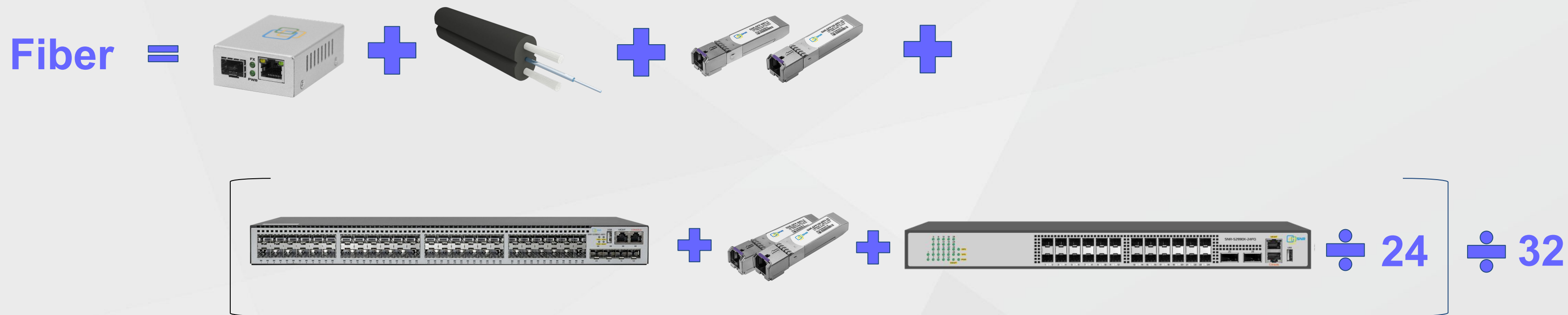
КРОС
2019



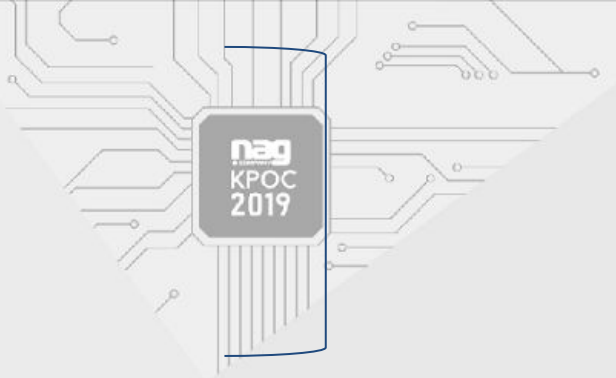
Методика расчета


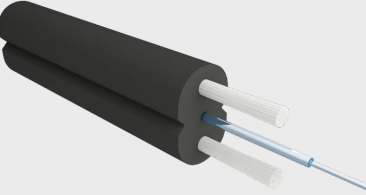


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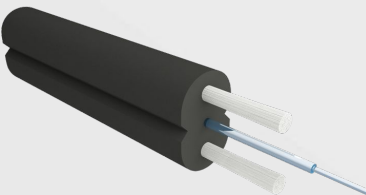

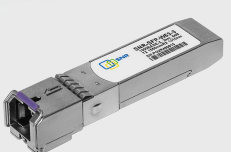
$$\text{FTTB} = \left[\text{кабель} + \left[\text{коммутатор} + \text{оптический адаптер} + \text{коммутатор} \right] \div 24 \right] \div 18$$


$$\text{Fiber} = \left[\text{маршрутизатор} + \text{оптический кабель} + \text{оптический адаптер} + \left[\text{коммутатор} + \text{оптический адаптер} + \text{коммутатор} \right] \div 24 \right] \div 32$$


Методика расчета

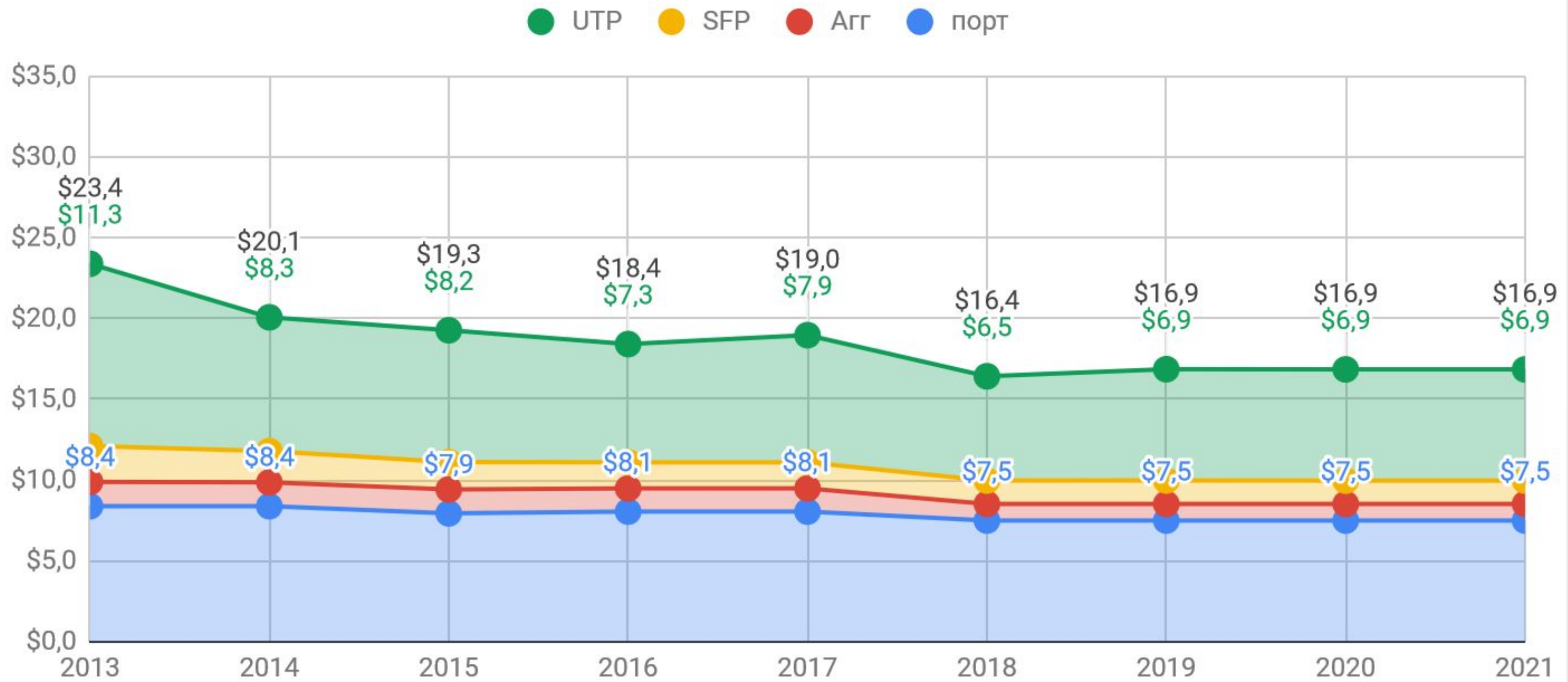


GPON =  **+**  **+** [ **+** ] **÷ 128**

GPON =  **+**  **+** [ **+** ] **÷ 256**

Fast Ethernet

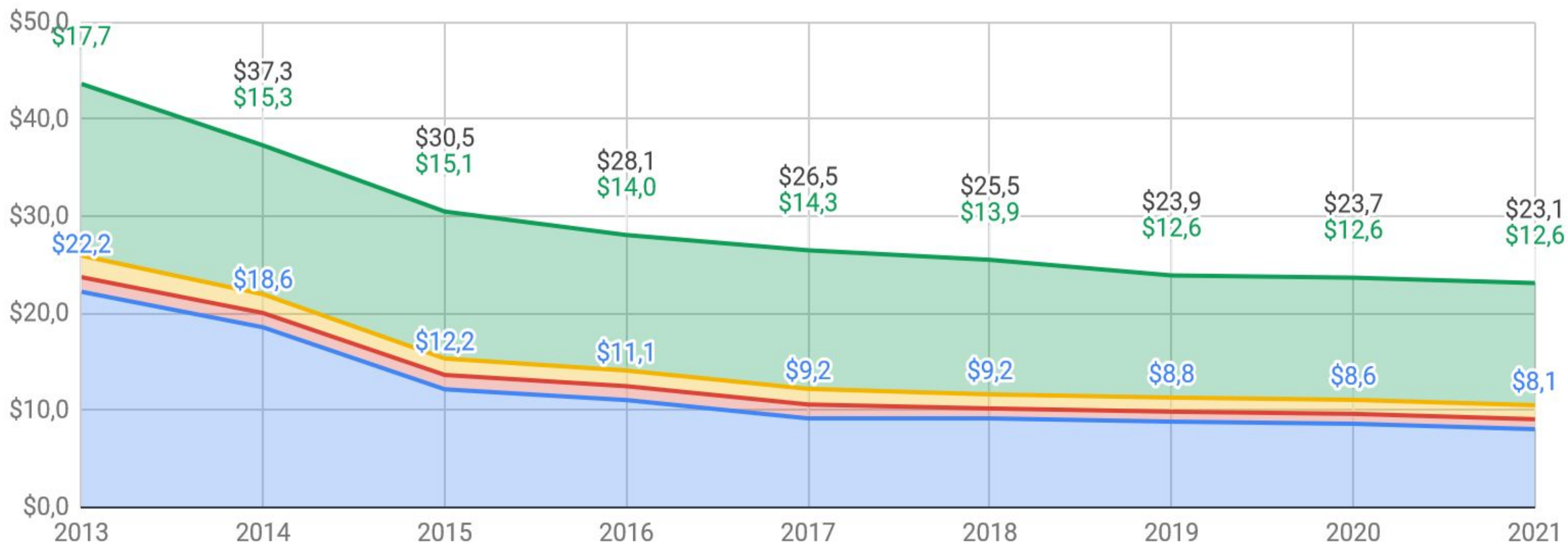
FE



Gigabit Ethernet c 1G Uplink

GE

■ UTP ■ SFP ■ Arr ■ порт

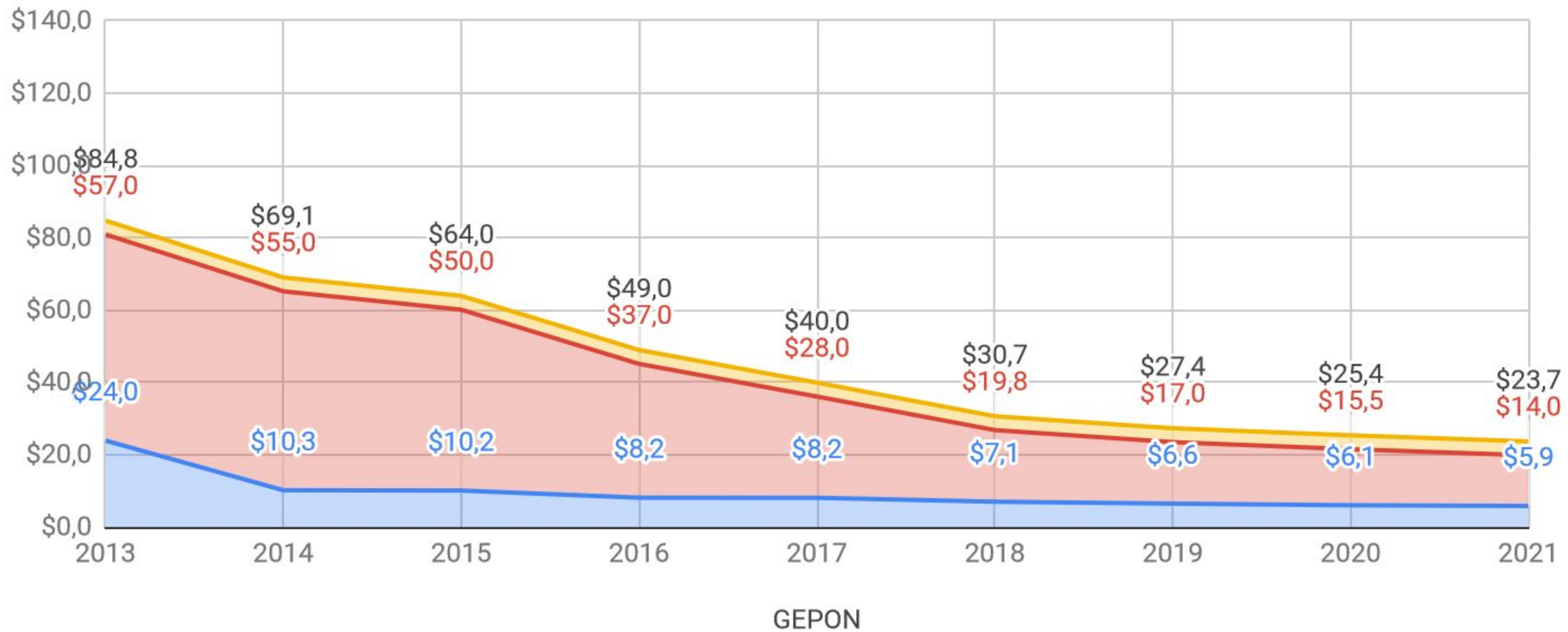


GE

GEPON

GEPON

кабель ONU OLT



GPON

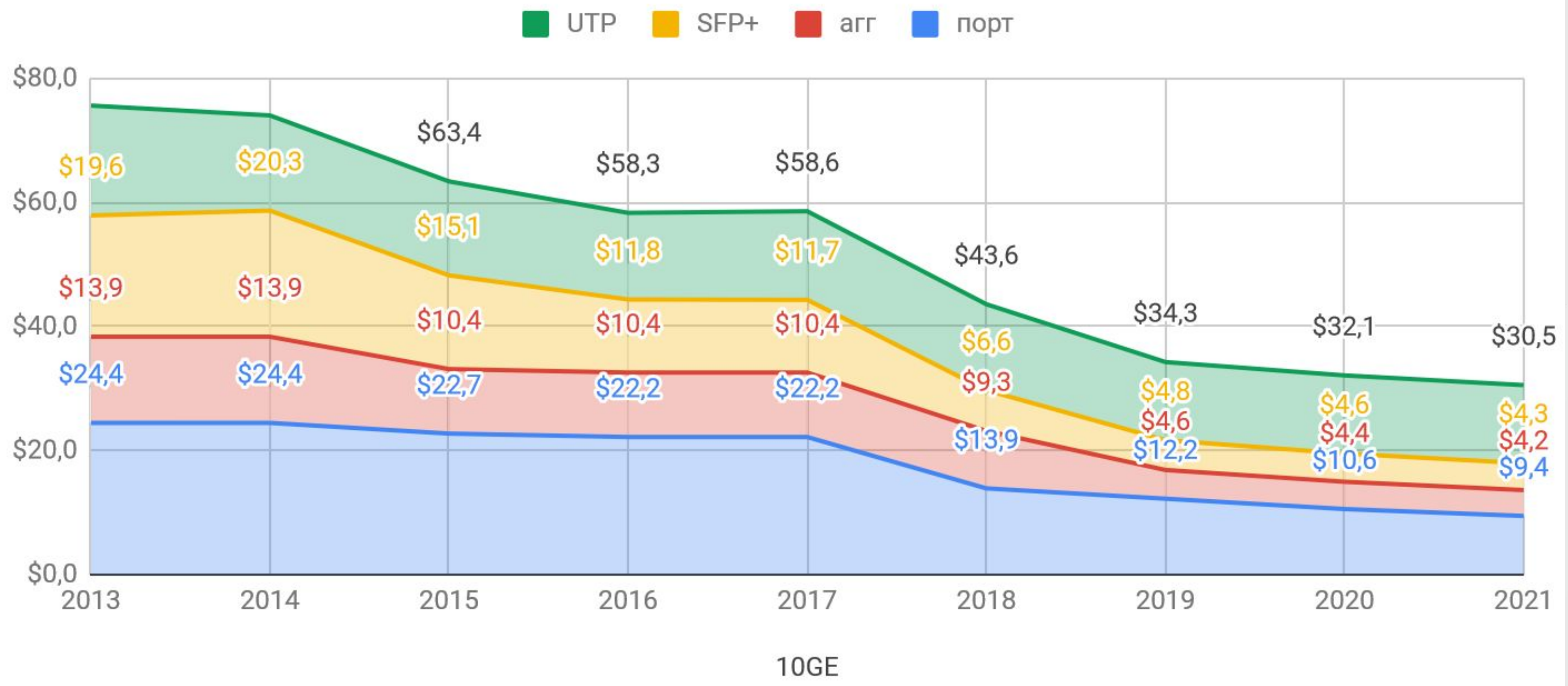
GPON



Gigabit Ethernet c 10G Uplink



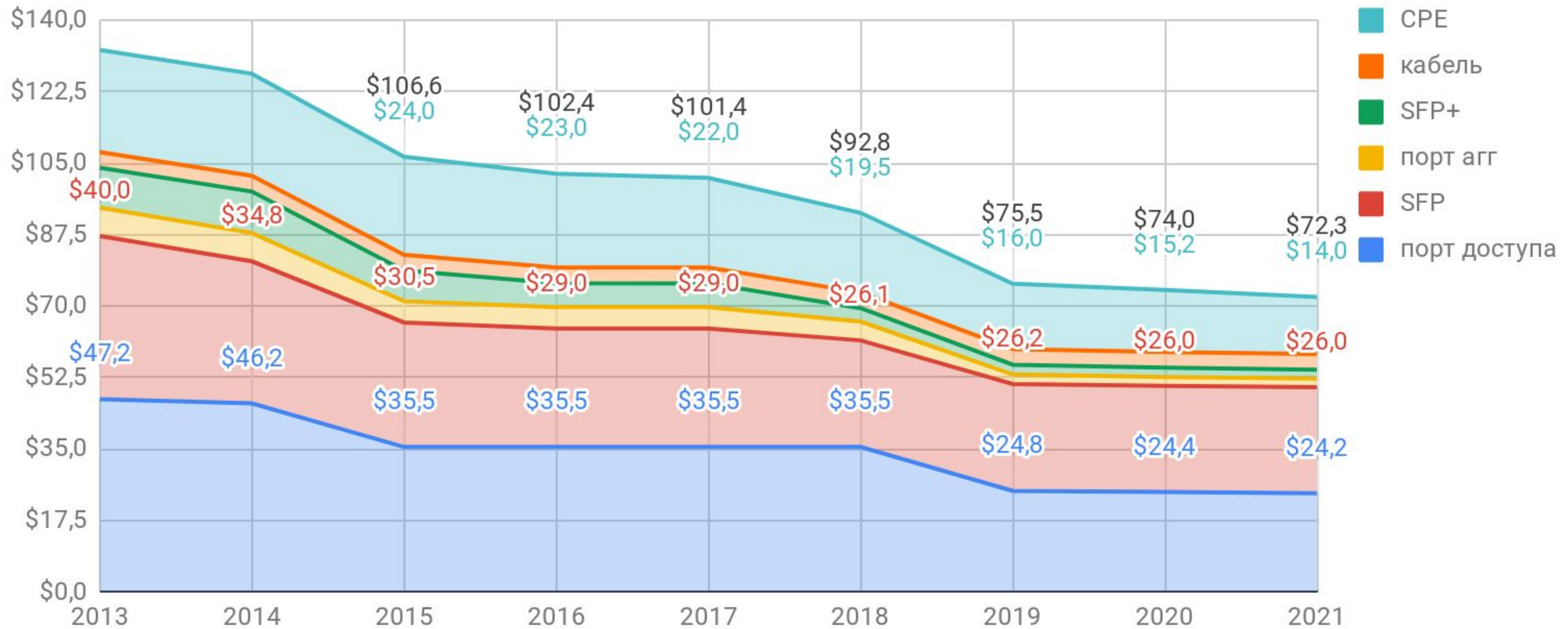
10GE



Fiber Gigabit Ethernet с 10G Uplink



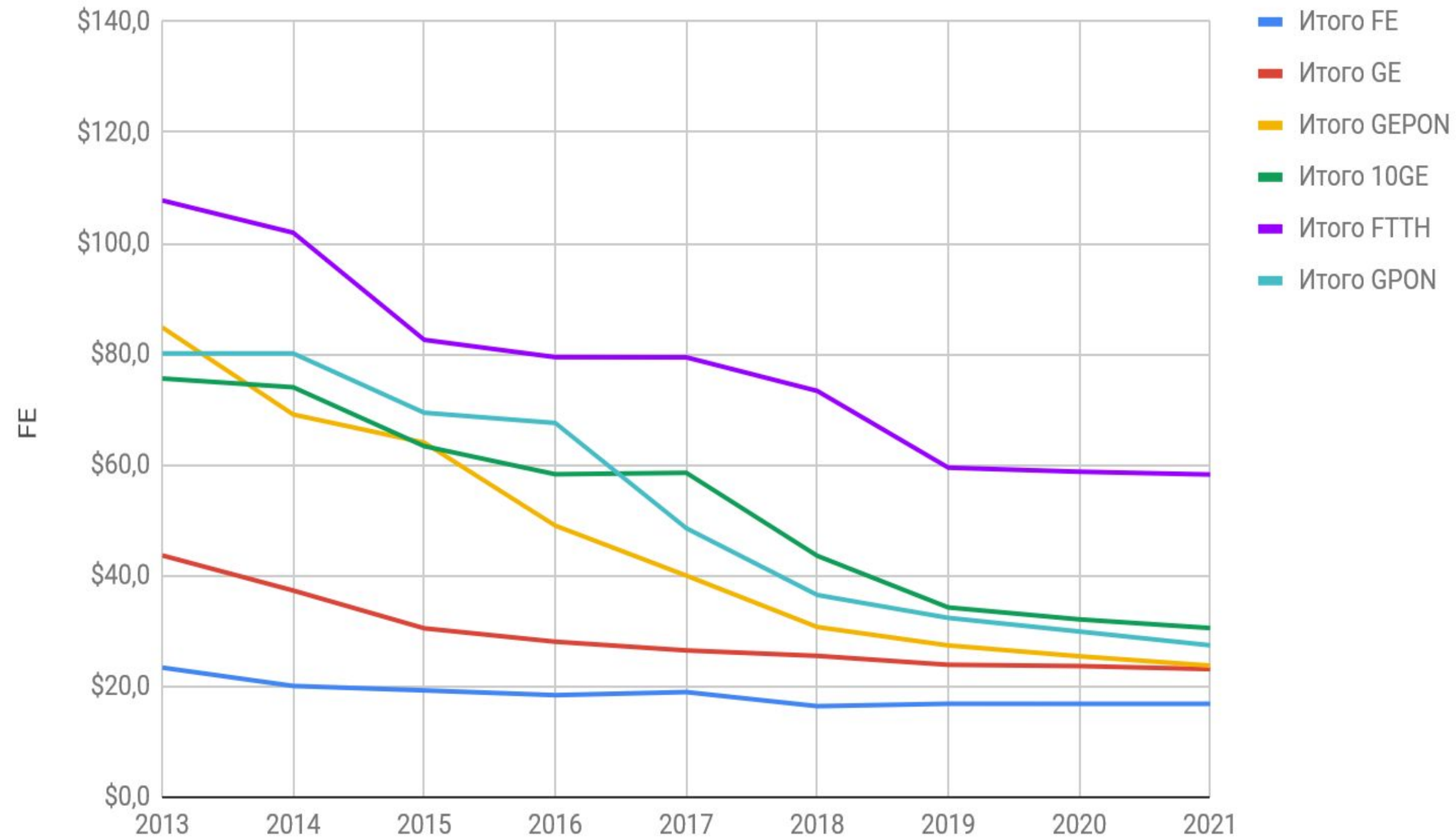
FTTH (оптический гигабит)



Стоимость абонентского порта

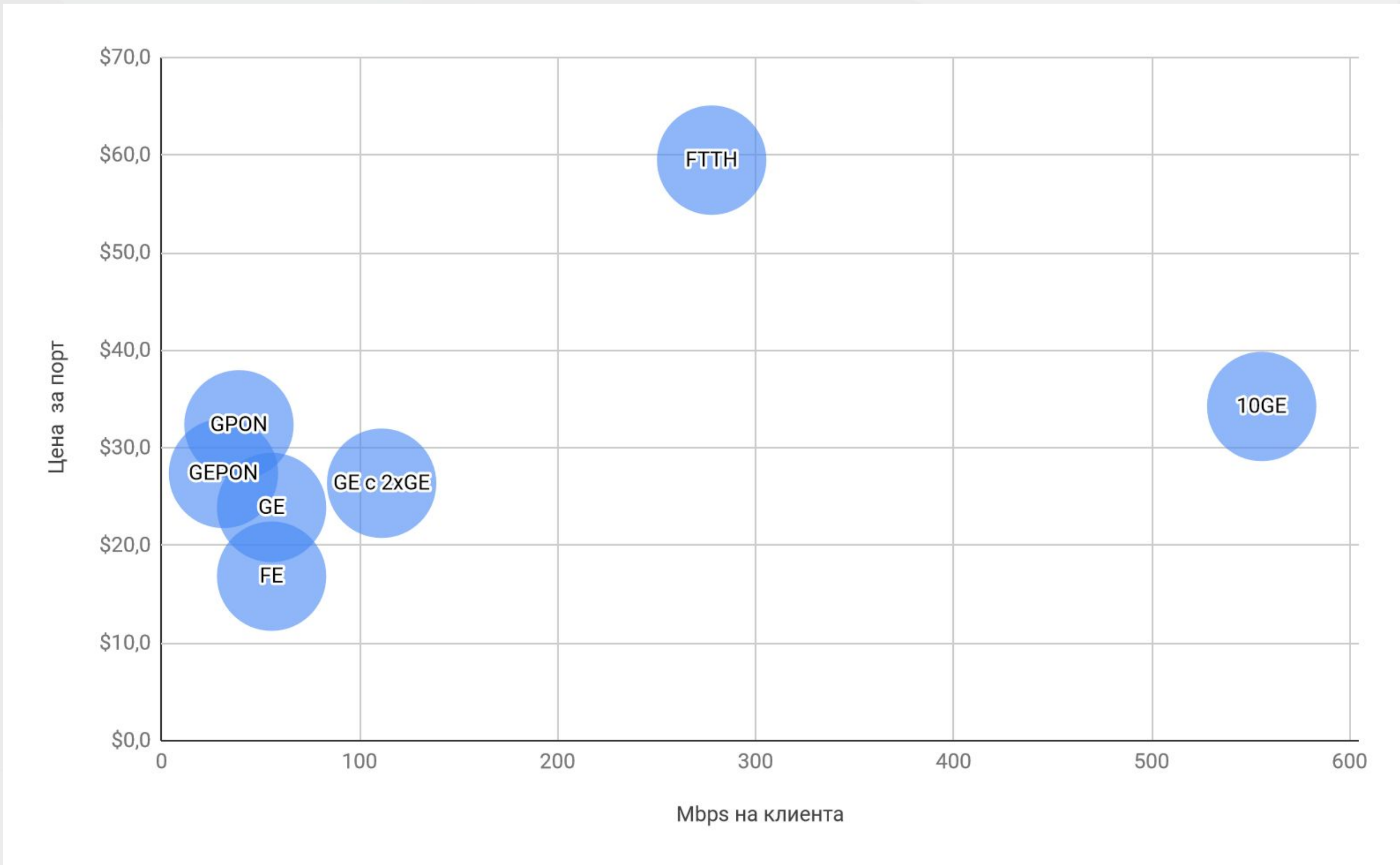
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Стоимость абонентского порта

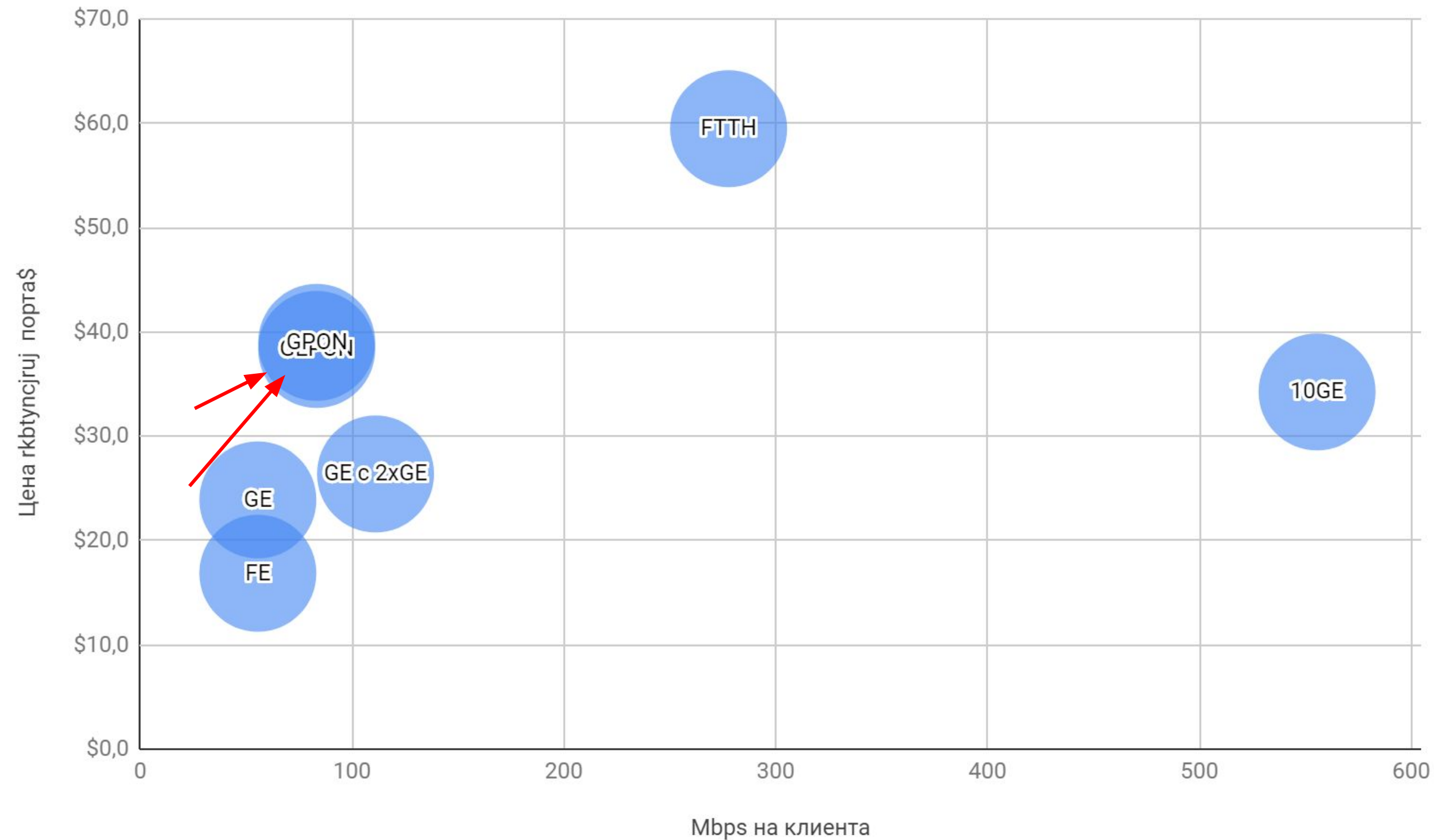


FE	\$16,9
GE	\$23,9
GEPON	\$27,4
GPON	\$32,4
10GE	\$34,3
FTTH	\$59,5

Стоимость порта/mbps на клиента (32 клиента GPON и 64 GPON)



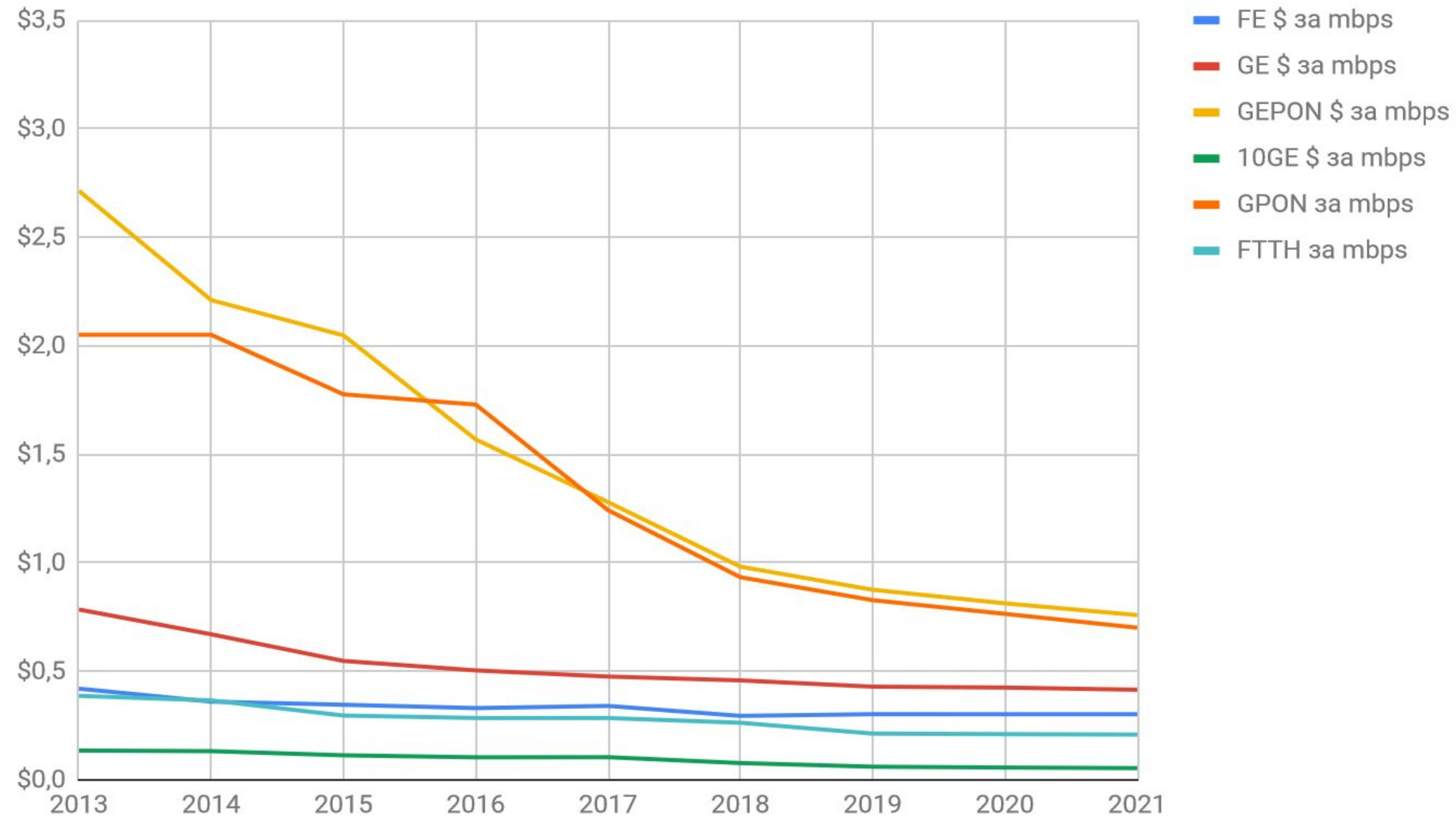
Стоимость mbps на клиента (12 на GPON, 30 GPON)



Стоимость Mbps на клиента

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Стоимость Mbps на клиента



10GE	\$0,06
FTTH	\$0,21
FE	\$0,30
GE	\$0,43
GPON	\$0,83
GEPON	\$0,88



Скорость доступа в интернет 2024 г. ?

Тренды



Видео, **Видео, Видео**

Тренды



Видео, **Видео, Видео**

Cloud gaming

RUSSIA

Total Bytes:	16 PB
Average Download Rate:	28.7 Mbps
Percentage of global Steam Traffic:	6.4%

PERFORMANCE BY INTERNET SERVICE PROVIDER (ISP)

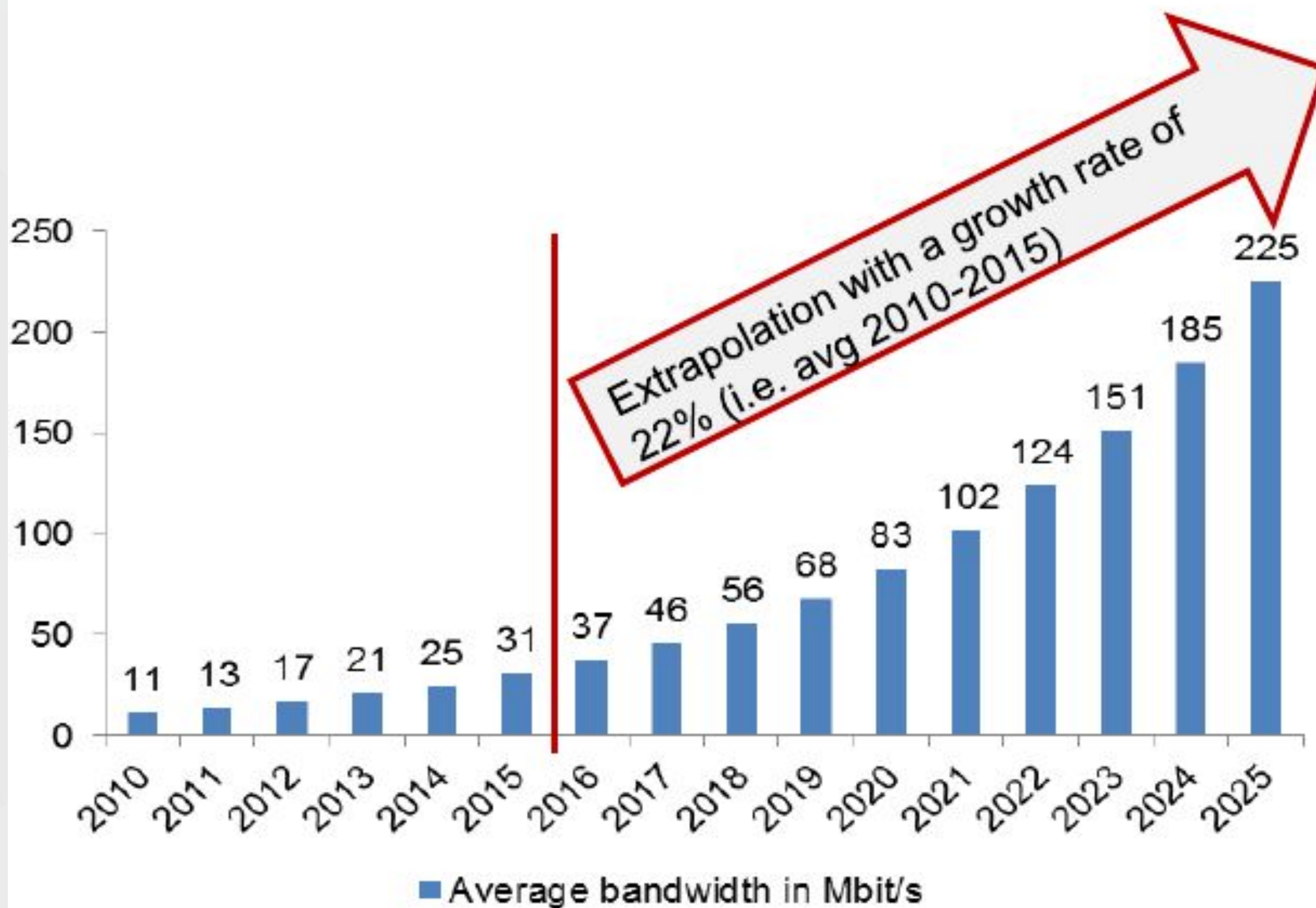
Shown below are the average download rates for Steam clients on the most popular Internet Service Providers for Russia, sorted by the number of bytes delivered to that network.

Network	Average Download Rate
Rostelecom	22.5 Mbps
JSC ER-Telecom Holding	37.9 Mbps
MTS PJSC	19 Mbps
Beeline Home	36.8 Mbps
OJS Moscow city telephone network	52.1 Mbps
Closed Joint Stock Company TransTeleCom	29.3 Mbps
Net By Net Holding LLC	35.2 Mbps
PJSC MegaFon	10.5 Mbps
OJSC Ufanet	34.7 Mbps
VimpelCom	17.8 Mbps



Cisco VNI: 43.7 Mbps в 2022 г.

Extrapolation of avg. bandwidth in Germany

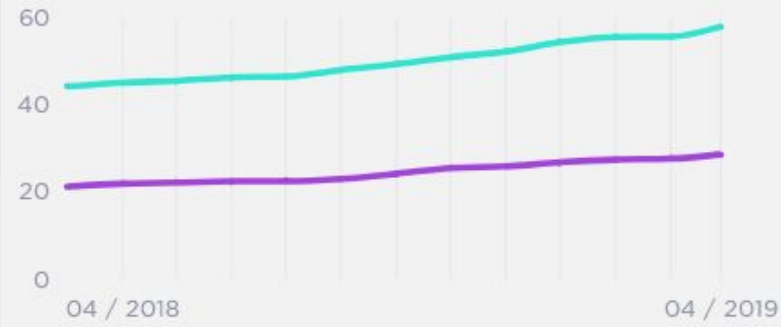


Speedtest.net



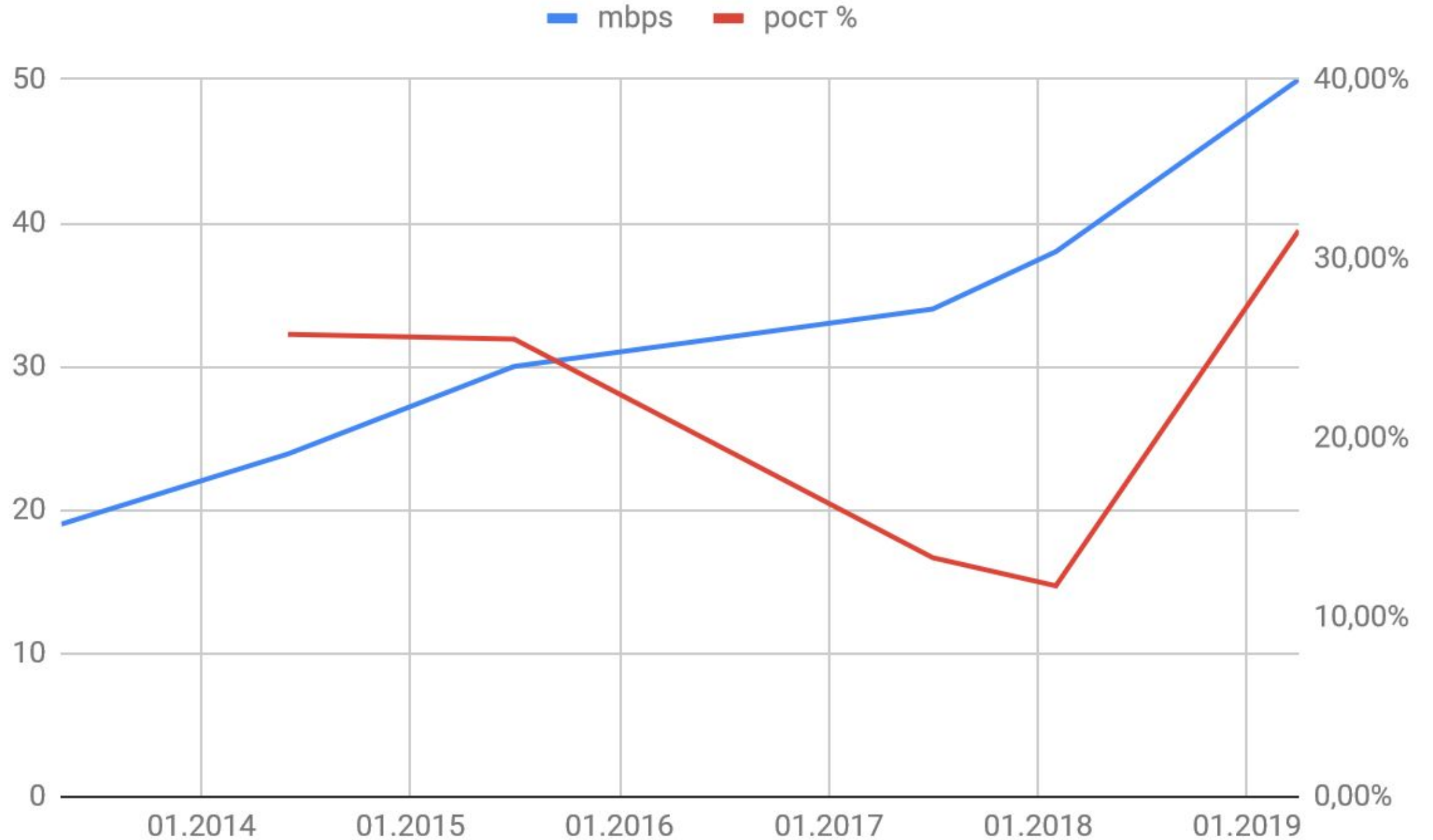
Global Average

Download **57.91** Mbps
Upload **28.68** Mbps

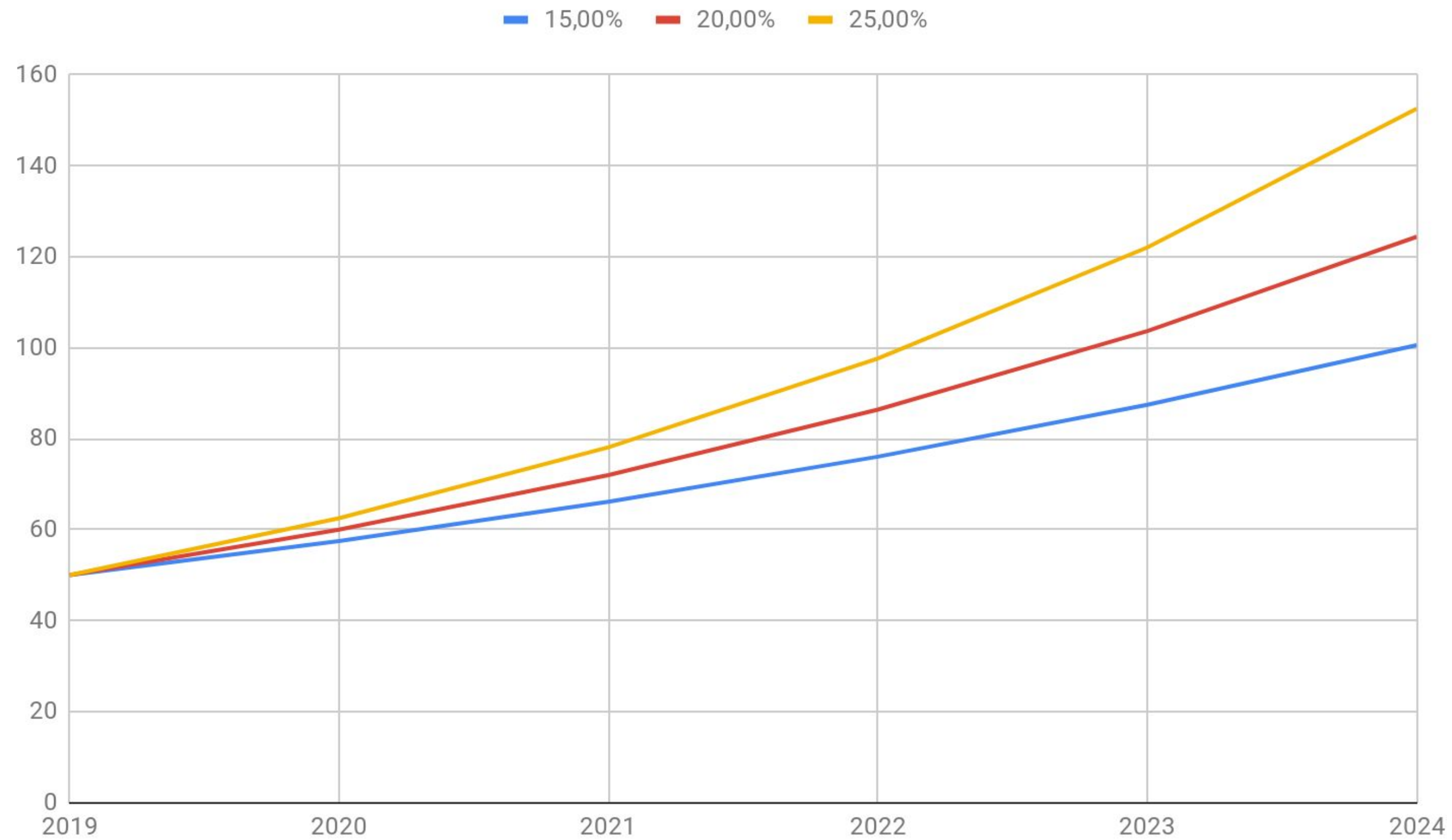


#	Country	Mbps
1	Singapore	199.62
2	Hong Kong (SAR)	168.69
3	Monaco	137.86
4	Romania	136.95
5	South Korea	132.63
6	Hungary	122.26
7	Sweden	120.42

46	Italy	51.46
47	Russia	50.43
48	Czech Republic	47.94



Прогнозы



Roadmap SNR 2019

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SNR-S2990X-24FQ

- 24x1/10GE SFP, 2x40GE QSFP
- L2
- 32K MAC
- AC+DC
- Broadcom ASIC

Q3 2019

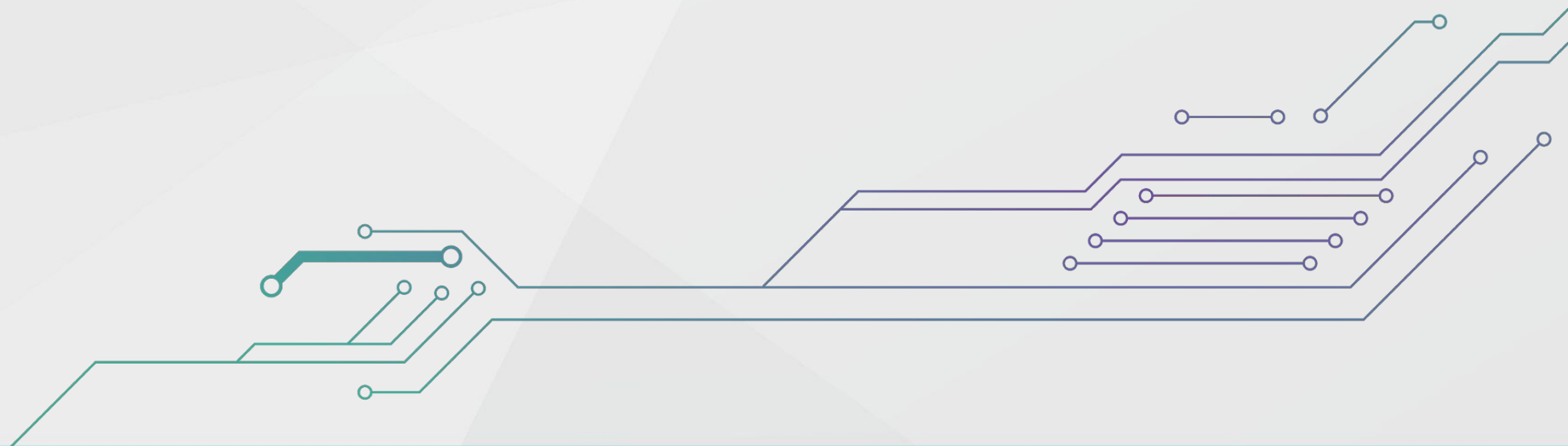


SNR-S300X-24FQ

- 8xGE, 24x1/10GE SFP, 2x40GE QSFP
- L3: OSPF, PIM, BGP
- 16K маршрутов
- 32K MAC
- AC+DC
- Broadcom ASIC

Q3 2019

Вопросы ?



Спасибо за внимание !