Multi-Gigabit Ethernet for Enthusiasts and Small Businesses

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What to expect

1) Why?

2) Short technical introduction

3) Fiber or copper?

4) Pricing, observations

5) Linux/ BSDs, Tips and Tricks

Why?

- High-speed SSDs and RAIDs ubiquitous

- Local backup to NAS, photographers

- WiFi access points with 802.11ac, 802.11ax (or WiFi 5 and 6), other uplinks

- Bonding load balancing problems

- Gigabit internet uplinks for home users available today

How does it work?

- IEEE 802.3ab or GBASE-T for Gigabit Ethernet over Twisted Pair

- IEEE 802.3an-2006 10GBASE-T for copper or IEEE 802.3ae-2002 10GBASE-{SR, LR, …} for fiber

- IEEE 802.3bz or NBASE-T for 2.5 and 5 Gbps Ethernet over Twisted Pair, same line encoding as 10GBASE-T but less spectral bandwidth (25% or 50%) → worse cables (Cat 5e, Cat 6) suffice

Copper or fiber?

Network equipment with RJ-45 „copper"
connections or SFP/ SFP+ „fiber" (or direct
attached copper/ cable)
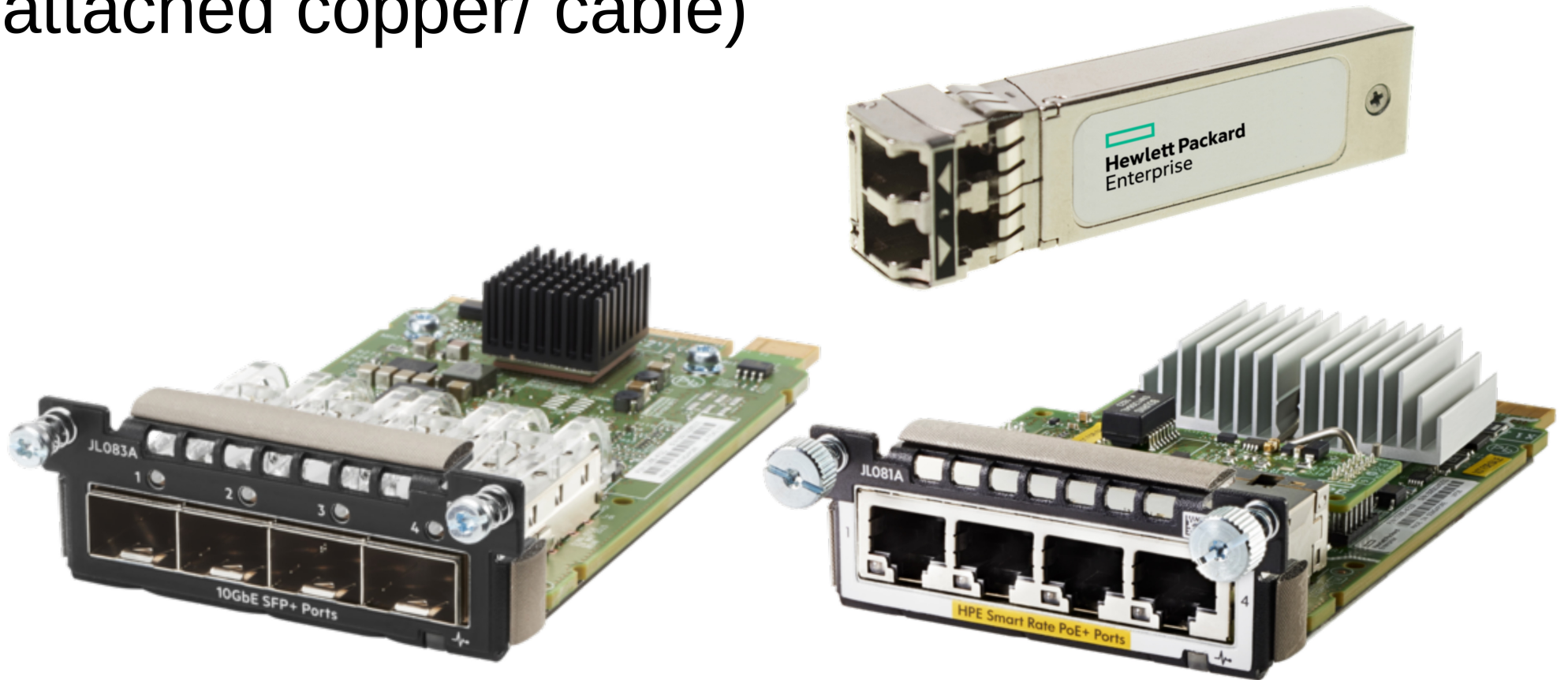
It comes down to switches

- Want to connect two servers/ workstations with 10 Gb to a switch and the rest of the network under 1000 € (~25 000 Kč)

- Switch must handle VLANs, dhcp snooping

- Routing, ACLs and management over SSH would be nice

- Stacking for redundancy, growth and ease of management would be nice also

Things to think about

- PoE/ WiFi-AP: NBASE-T

- Datacenter: DAC or optics, lower power and better availability

- Workstations: PCIe add-on cards available, boards with integrated 10GBASE-T appear

- For clients NBASE-T over USB 3.X or Thunderbolt easier to get (Promise Sanlink, Sonnettech Thunderbolt 3 adapter)

The equipment, some tips

- Fiberstore S3900-24T4S, 24 Gigabit Ports, 4x SFP+, <300 €, stackable (4), internal red. PSU, dynamic routing, software updates?

- Ubiquiti EdgeSwitch (ES-16-XG), 12 SFP+ and 4x 10GbE, <550 €, compromises

- HPE OfficeConnect 1950 (JG960A), 24 GbE, 2x 10GbE, 2xSFP+, IRF stacking, ~610 €, full CLI can be enabled, some static routing

- Netgear ProSAFE XS708T, 6x 10GbE, 2x SFP+/ 10 GbE, only web menagement, ~630 €

- MikroTik CRS317-1G-16S+RM or CRS328-24P-4S+RM

- Based on Jardas comment: Cisco SG350X-24, ~500 €, 2 SFP+ & 2 SFP+/ RJ-45, stackable, static routing, software updates for the warranty term (limited lifetime)

Network cards

- Intel 82599EN based SFP+ single or dual-port for ~145 € or ~170 €

- Aquantia AQC107 single port SFP+ or RJ-45 ~110 € Edimax (EN-9320SFP+, EN-9320TX-E), Trendnet etc.

- Cheaper solutions from Realtek, Aquantia at least for 2.5 GBASE-T or USB 3.x underway

- 3rd party SFP+ transceivers cheap 20 – 50 €/ piece (SR/ LR → multimode/ singlemode)

Linux, BSDs

- x86-64/ AMD64 current CPUs can do 10 Gbps linerate even with mild firewalling

- Drivers for NICs are mostly available, e.g. Aquantia AQC107 in kernel 4.11

- In general „it just works"

Conclusion

- It is possible to create a 10 GbE backbone for under 1000 €:

  - 300 € for a switch

  - 2x 150 € for NICs

  - Patchcables and 4x transceivers for ca. 100-150 €

- But still some rough edges

- Missing motivation for most customers