Use of the GEANT network at CERN

History, current set up and future

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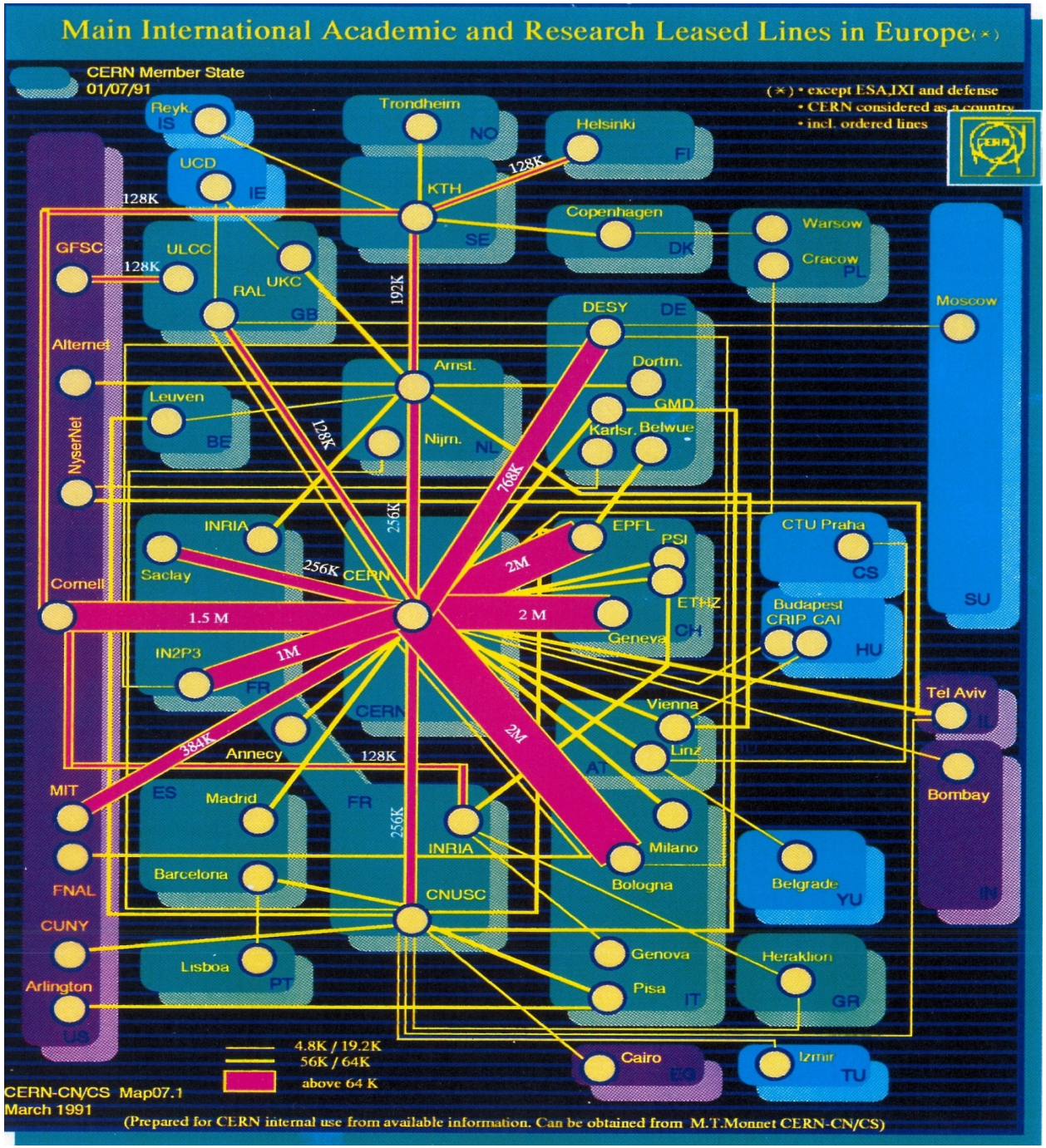
History

1991: Before DANTE



"In 1991, 80% of the Internet capacity in Europe for international traffic was installed at CERN, in building 513"

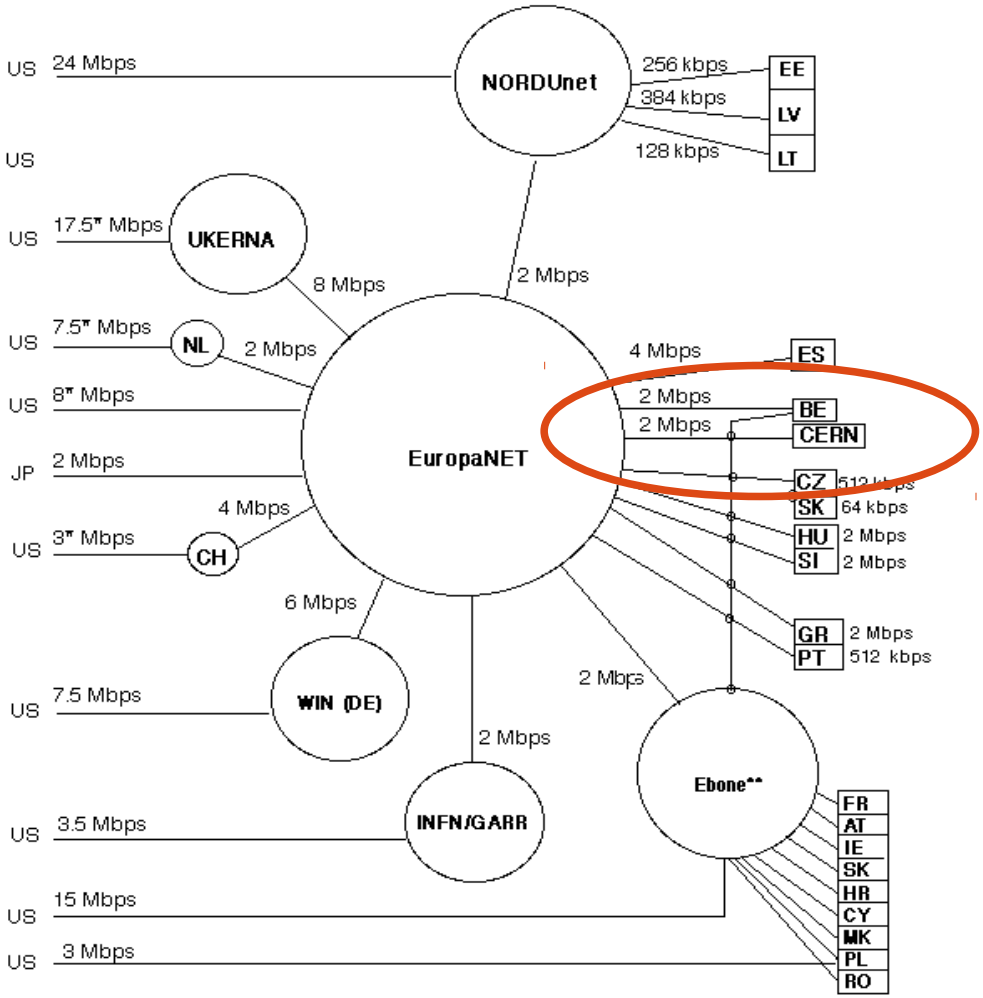
http://home.web.cern.ch/cern-people/opinion/2013/06/how-internet-came-cern

1994: Europanet - 1Mbps

Table 3.1 EuropaNET (backbone) access ports (July 1994).

Country	Research network	Public data network	Capacity (kbps)	Service
Austria	ACOnet		64	IP
Belgium	BELNET-IP		1984	IP
	EC		64	X.25
		DCS	64	X.25
	JRC-Geel		64	X.25
	RESULB		64	X.25, IP
Czech Republic	CESNET		512	IP
Denmark		DATAPAK	64	X.25
Germany	WIN		2048	X.25, IP, CLNS
Greece	ARIADnet		64	X.25, IP, CLNS
		HELLASPAC	64	X.25
Hungary	HUNGARNET		64	IP
		BMEnet	64	IP
		PLEASE	64	X.25
Ireland	HEAnet		64	X.25, IP
Italy	GARR-IP		2048	X.25
	GARR		64	X.25
	JRC/Ispra		64	X.25
Luxembourg	RESTENA		64	X.25, IP
		LUXPAC	64	X.25
Netherlands	SURFnet-IP		1984	IP
	SURFnet		64	X.25, CLNS
		AMS-GWY (to commercial ISPs)	1984	IP
		DN1	64	X.25
	ESAPAC		64	X.25
Portugal	RCCN-IP		64	IP
	RCCN		64	X.25, IP, CLNS
		TELEPAC	64	X.25
Romania	ICI		9.6	X.25
	PUB		9.6	X.25, IP
Slovenia	ARNES		128	X.25, IP
		SIPAX.25	64	X.25
Spain	REDIRIS		2048	X.25, IP, CLNS
	IBERPAC		64	X.25
Sweden	NORD-IP		1984	IP
	NORDUnet		64	X.25, CLNS
Switzerland	SWITCH-IP		1024	IP
	SWITCH		128	X.25, IP, CLNS
	CERN		1024	IP
	Gateway EuropaNET-Ebone		512	IP
UK	JANET-IP		2048	IP
	JANET		2048	X.25, IP

(Intercontinental) connectivity of European research networks, August 1996

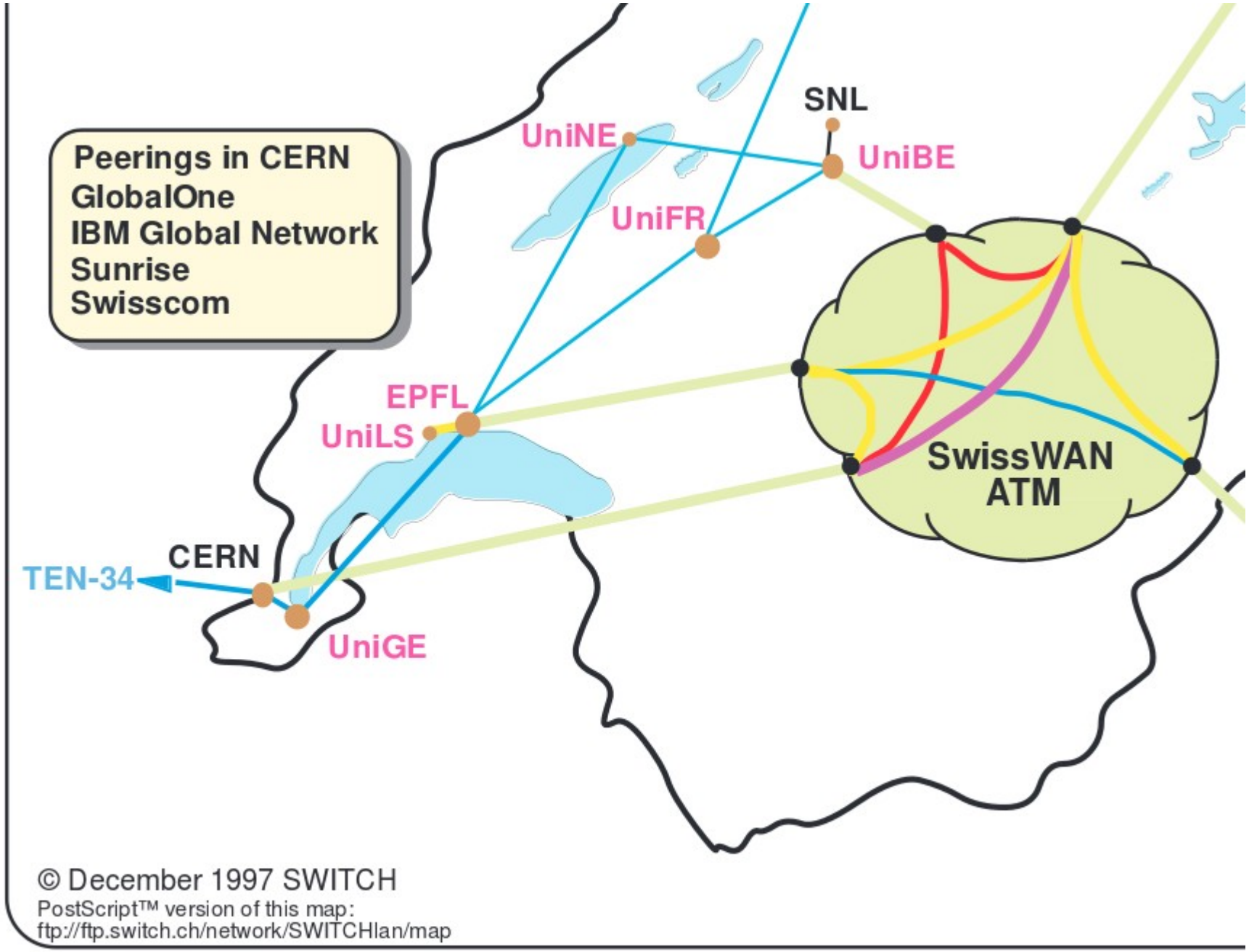


Notes:
1. Connections shown are symbolic; actual line configuration may be different.
2. Other links with Europe and transatlantic connections used exclusively by commercial service providers are not shown.
3. Link capacities are those in place in December 1995; figures in parentheses indicate committed upgrade.
4. Several of the networks shown also provide transit services for countries in North Africa, the Middle East and for Russia.

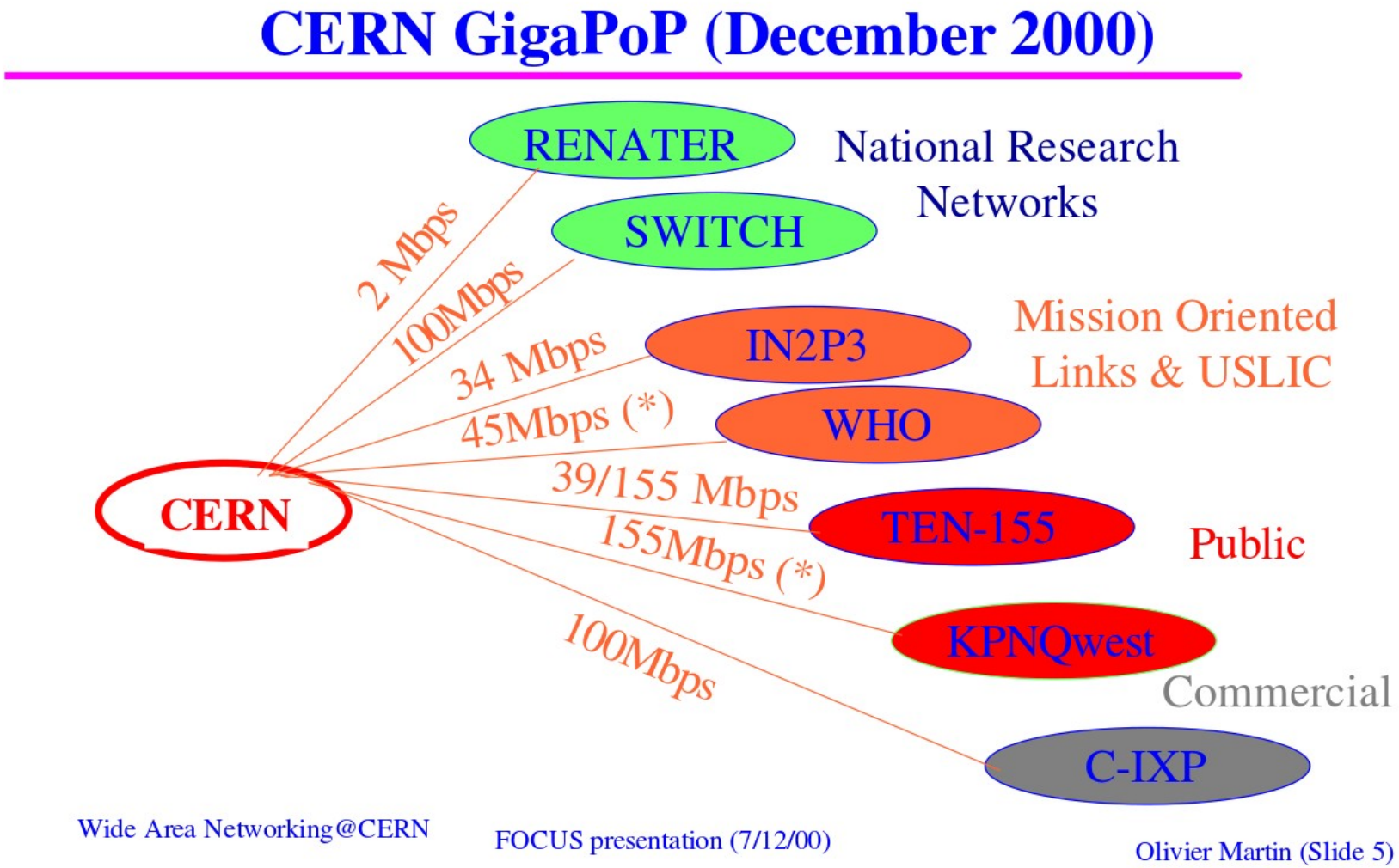
*DANTE organises 9 Mbps of the UKERNA (UK) connectivity, 6 Mbps of the SURFnet (NL) connectivity and the 3 Mbps SWITCH (CH) capacity

** Ebone connects research as well as commercial networks

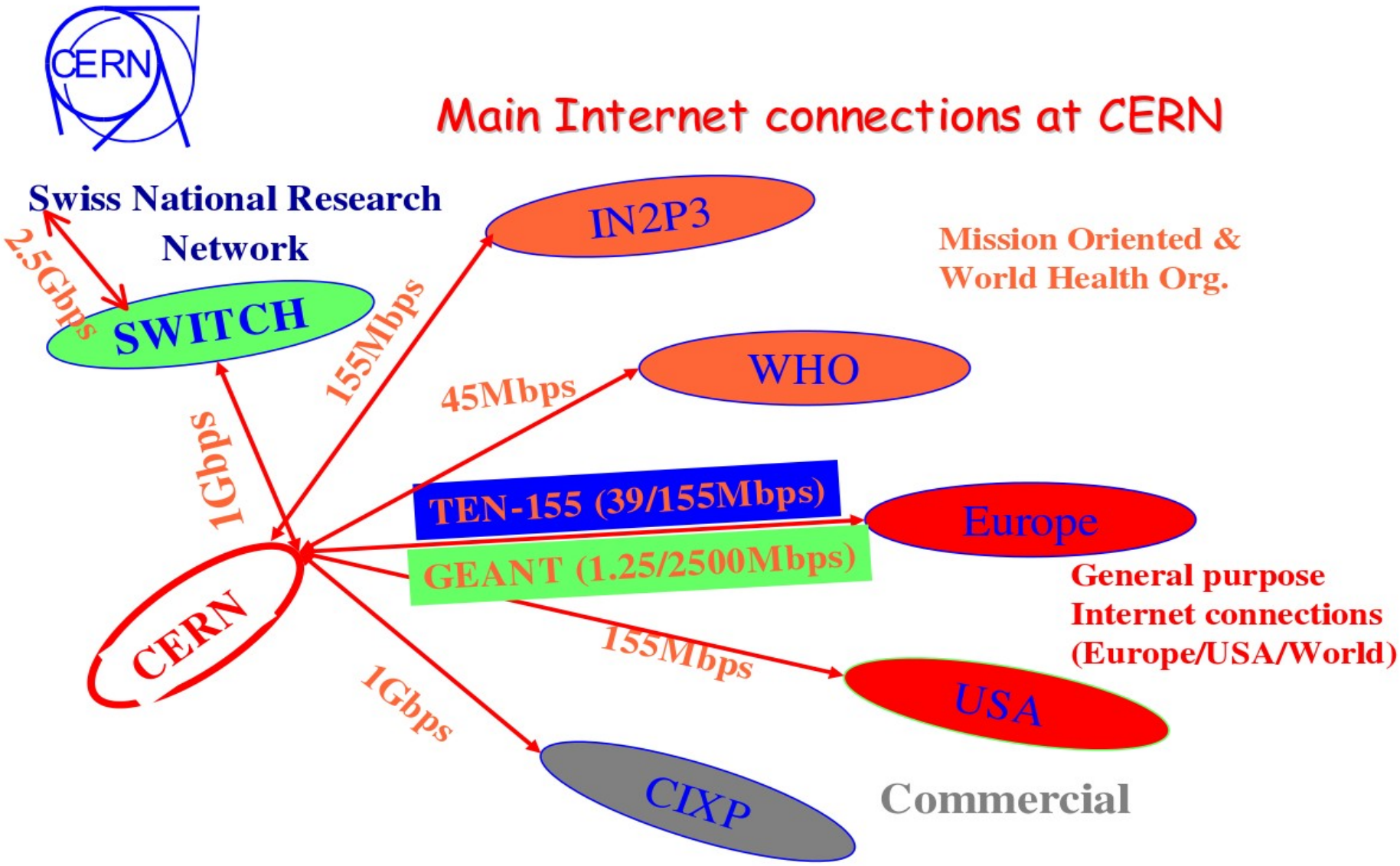
1997: TEN-34 - 34Mbps



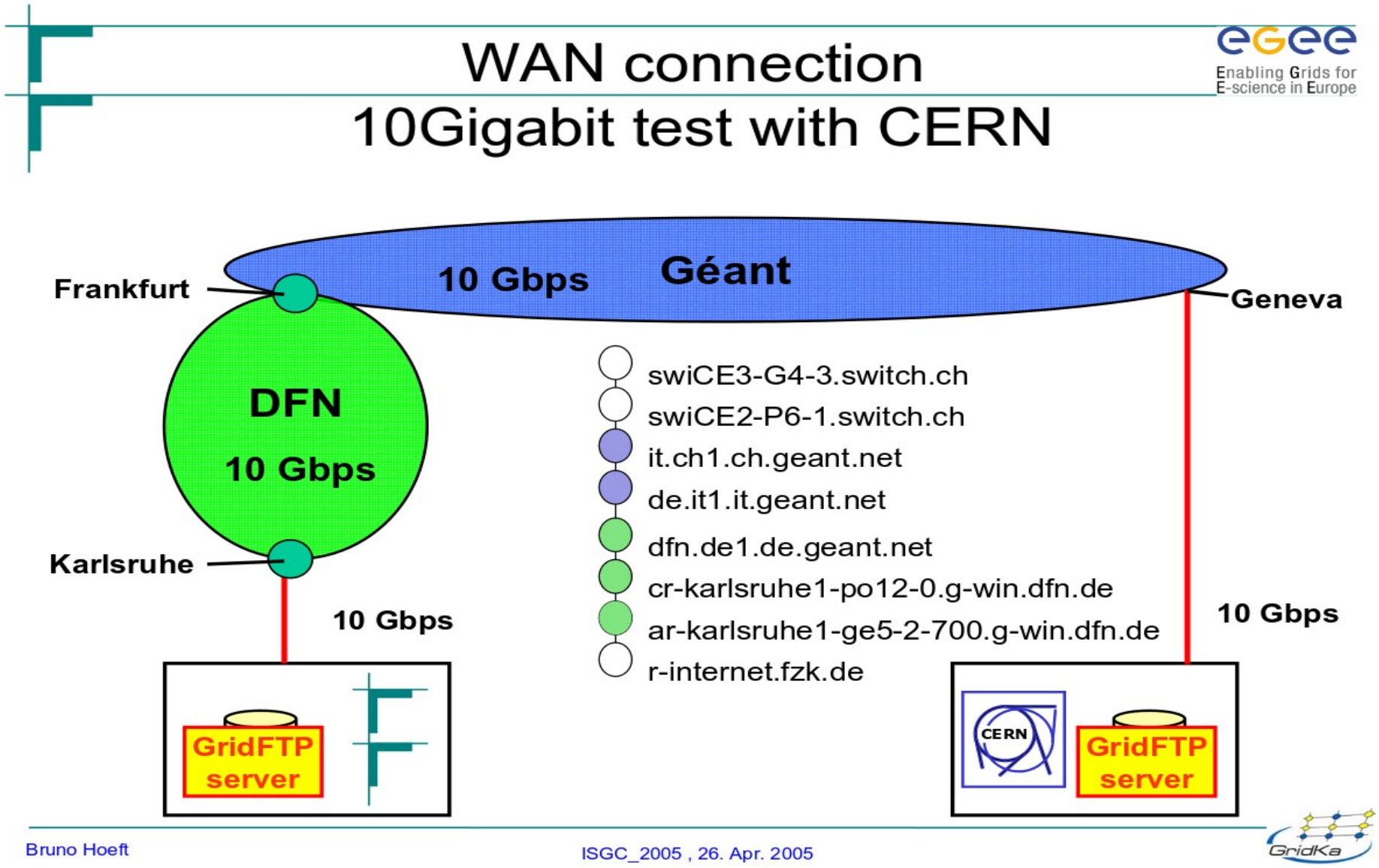
1999: TEN-155 - 155Mbps



2001: GEANT - 2.5Gbps

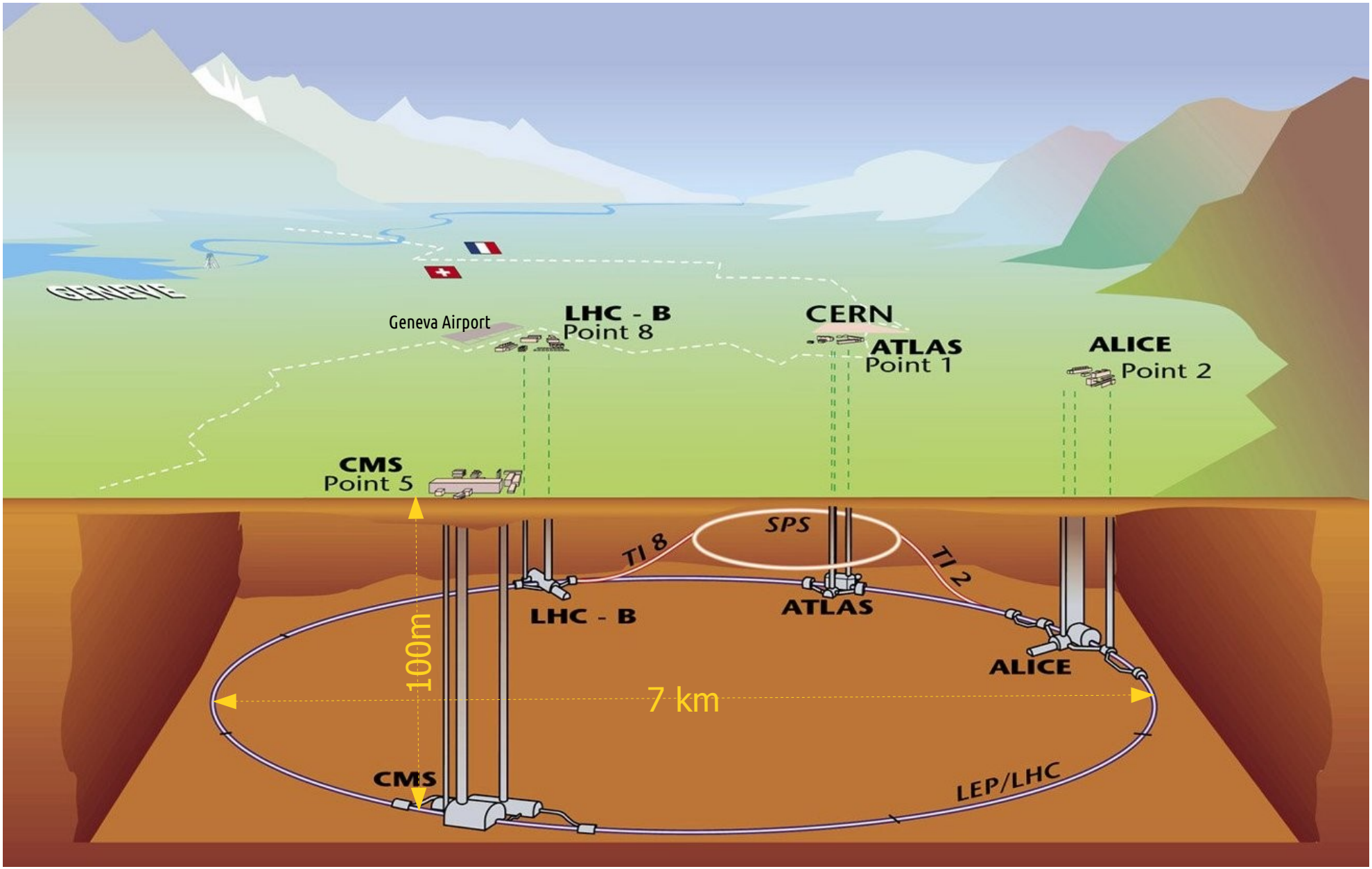


2005: GEANT2 - 10Gbps via SWITCH

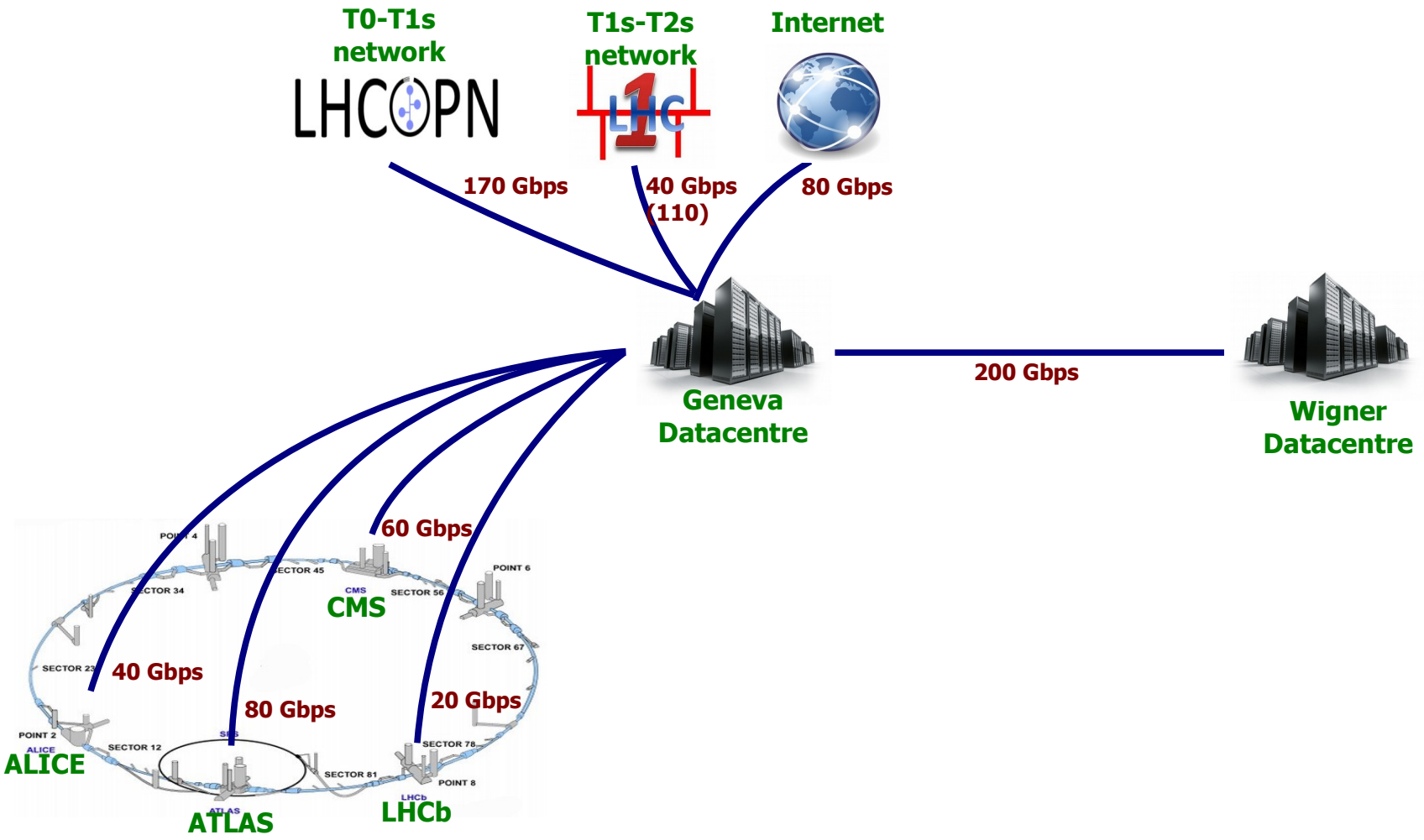


Current Setup

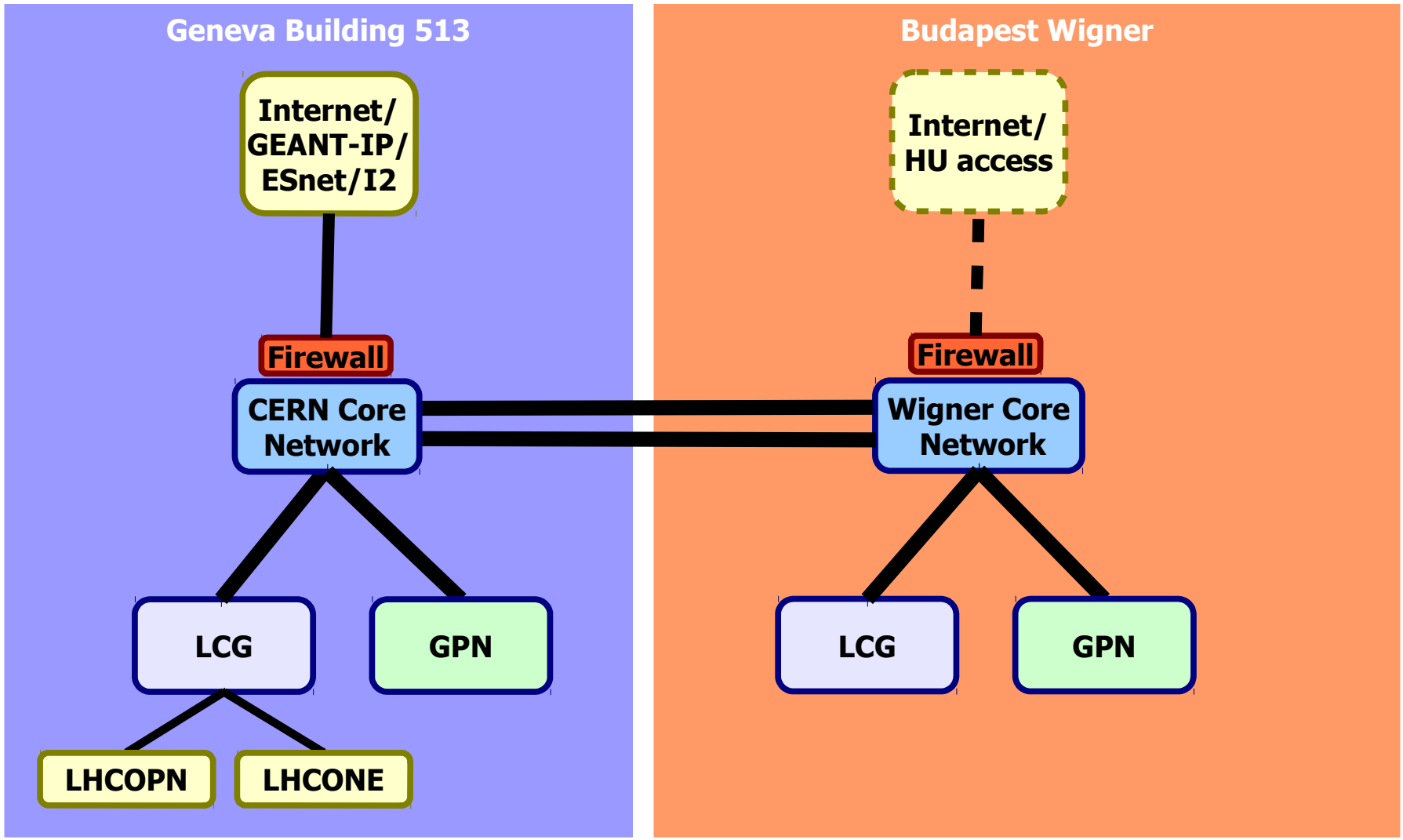
CERN Topology



Main connections for LHC data



CERN Data Centres



CERN Tier0 resources

MEYRIN DATA CENTRE	last_value
Number of Cores in Meyrin	93,937
Number of Drives in Meyrin	65,716
Number of Memory Modules in Meyrin	66,167
Number of 10G NIC in Meyrin	3,708
Number of 1G NIC in Meyrin	18,776
Number of Processors in Meyrin	18,018
Number of Servers in Meyrin	9,808
Total Disk Space in Meyrin (TB)	99,329
Total Memory Capacity in Meyrin (TB)	344

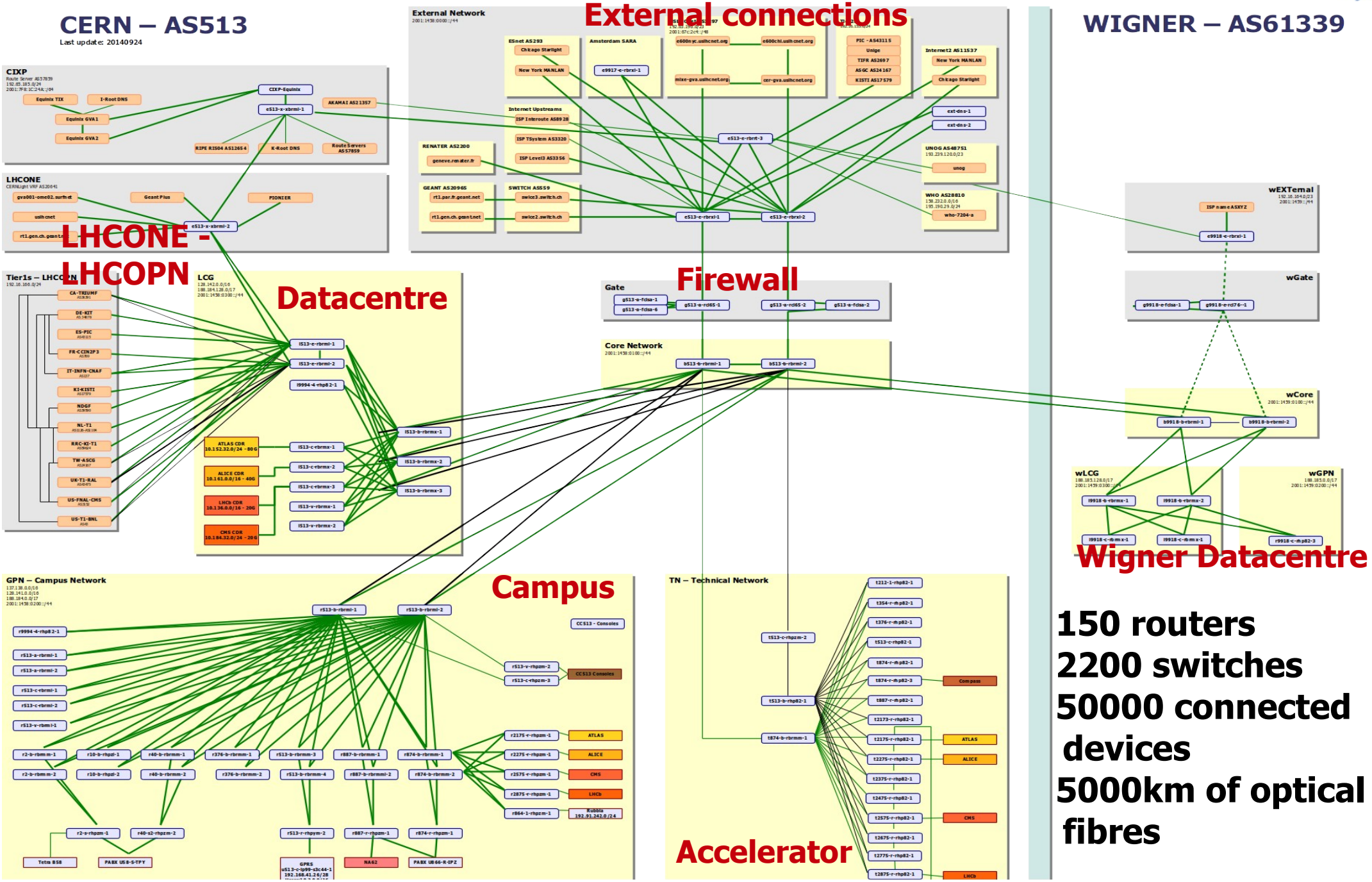
WIGNER DATA CENTRE	last_value
Number of Cores in Wigner	20,544
Number of Drives in Wigner	10,921
Number of Memory Modules in Wigner	10,247
Number of 10G NIC in Wigner	1,211
Numer of 1G NIC in Wigner	2,292
Number of Processors in Wigner	2,570
Number of Servers in Wigner	1,288
Total Disk Space in Wigner (TB)	32,584
Total Memory Capacity in Wigner (TB)	83

NETWORK AND STORAGE	last_value
Tape Drives	141
Tape Cartridges	50,622
Data Volume on Tape (TB)	98,604
Free Space on Tape (TB)	13,549
Routers (GPN)	135
Routers (TN)	24
Routers (Others)	101
Star Points	631
Switches	3,229

https://dashboards.cern.ch/public/_plugin/kibana/#/dashboard/elasticsearch/Overview:%20Data%20Centre

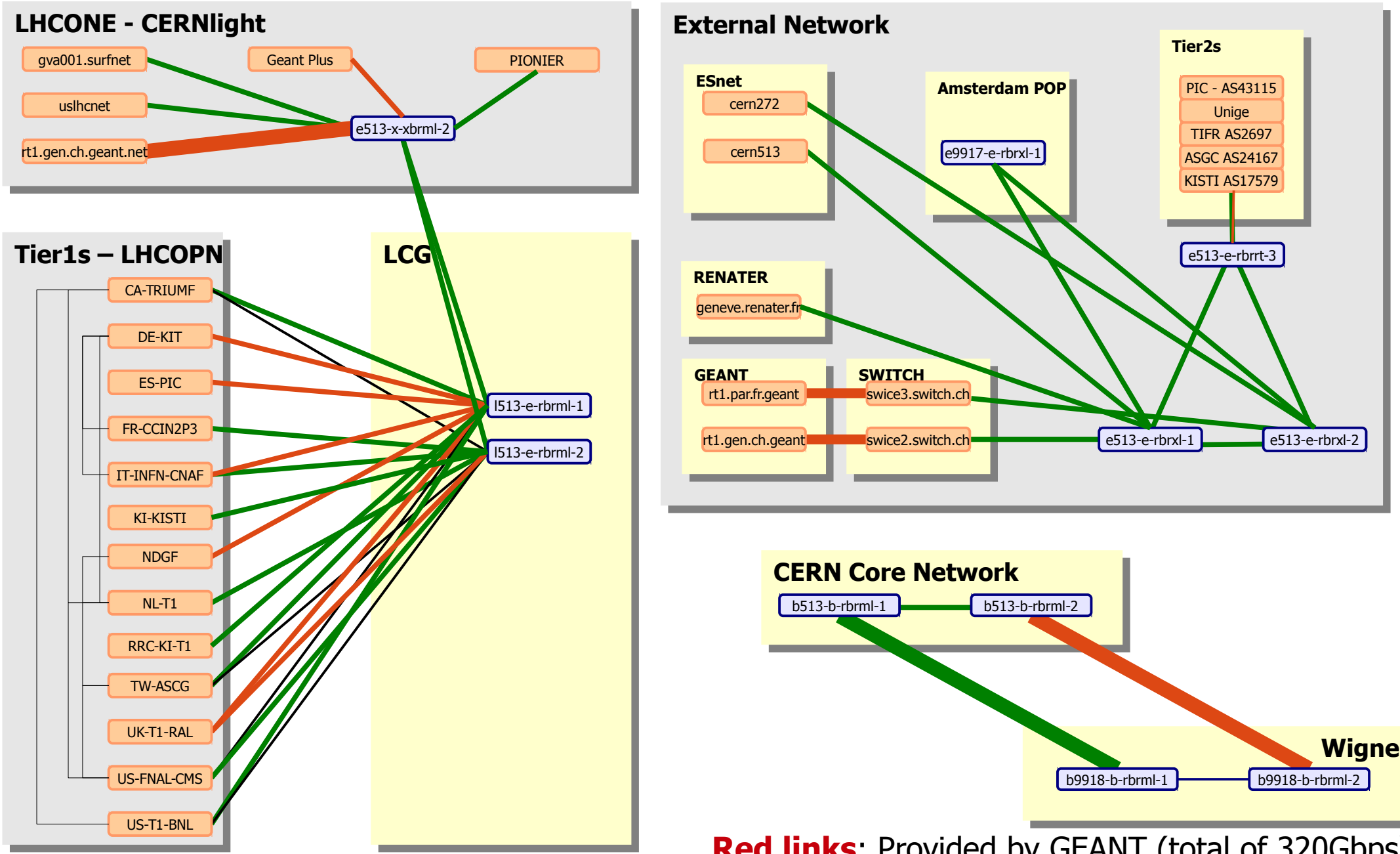
October 2014

Networks in details



150 routers
2200 switches
50000 connected devices
5000km of optical fibres

Connections by Geant



Red links: Provided by GEANT (total of 320Gbps)

Future

GEANT IP

Currently:

- No direct connection to CERN, transit via SWITCH
- Primary peering: 30G Secondary: 20G

Possible evolution:

- one peering with CERN, one with SWITCH;
  Mutual backup between CERN and SWITCH.
- 100G access
- access in Wigner

Currently:

- one 10G uplink. Used for ES-PIC (Tier1) backup and Wigner OOB backup

Possible evolution:

- move to the 100G used for LHCONE.

LHCOPN links

Currently:

- multiple 10G links

Possible evolution:

- tagged VLANs over a pair of 100G links (a la EEX)

LHCONE

Currently:

- Peering with the CERNlight LHCONE VRF
- Recently upgraded to one 100G link.

Possible evolution:

- LHCOPN backup
- Access in Wigner
- Implementation of the LHCONE P2P service

WIGNER, Budapest

Currently:

- One 100Gbps Layer2 link Geneva-Budapest

Possible evolution:

- One additional 100Gbps link, more in the future
- GeantIP access, LHCONE

Questions?