

# Tier-0 and LHCOPN update

LHCOPN-LHCONE workshop  
CERN – Geneva, Switzerland

14<sup>th</sup> January 2020

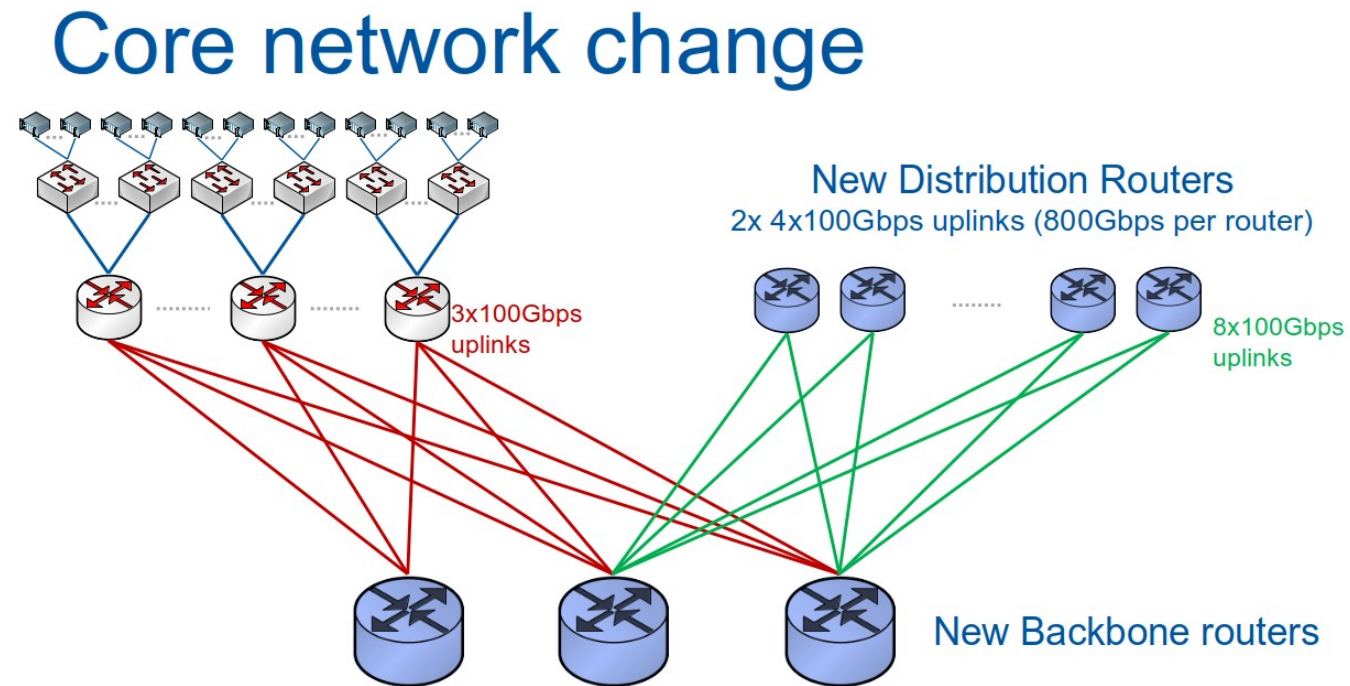
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# **CERN Tier-0 update**

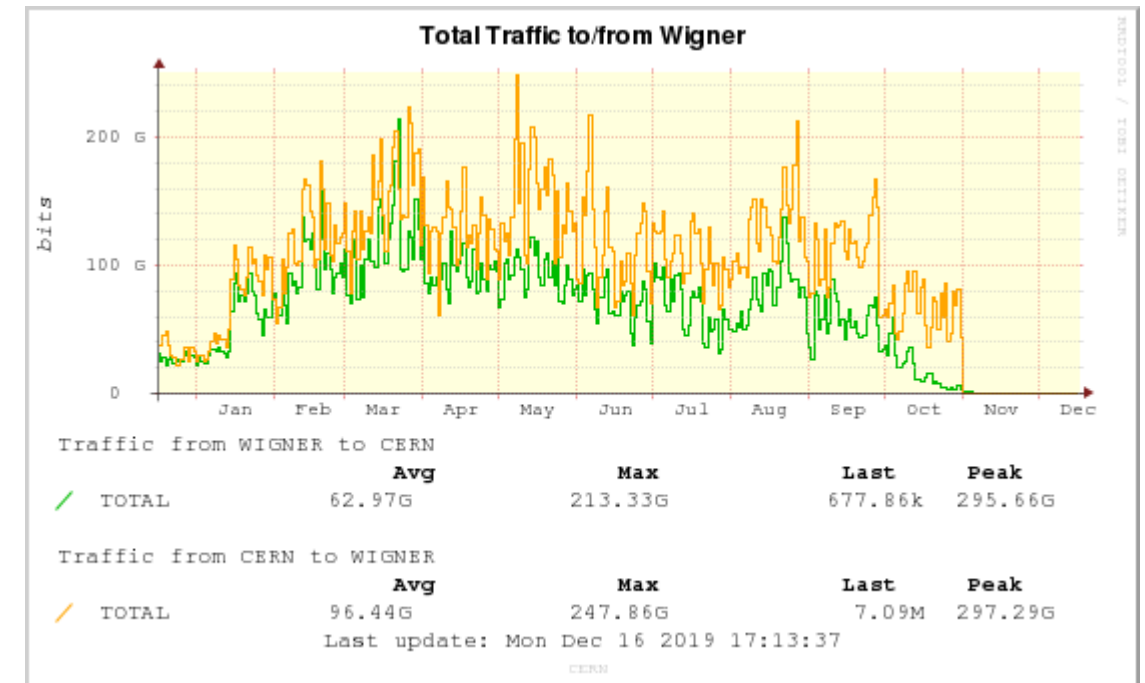
# CERN data-centre B513

- Brocade MLXE being replaced by Juniper QFX10008
- Increasing new routers' interconnections to 800 Gbps with possibility to grow to 1.6Tbps
- Deploying new architecture with router redundancy using VXLAN ESI-LAGs (Ethernet Segment Identifier)
- Testing Openstack integration for IP mobility (Tungsten Fabric)



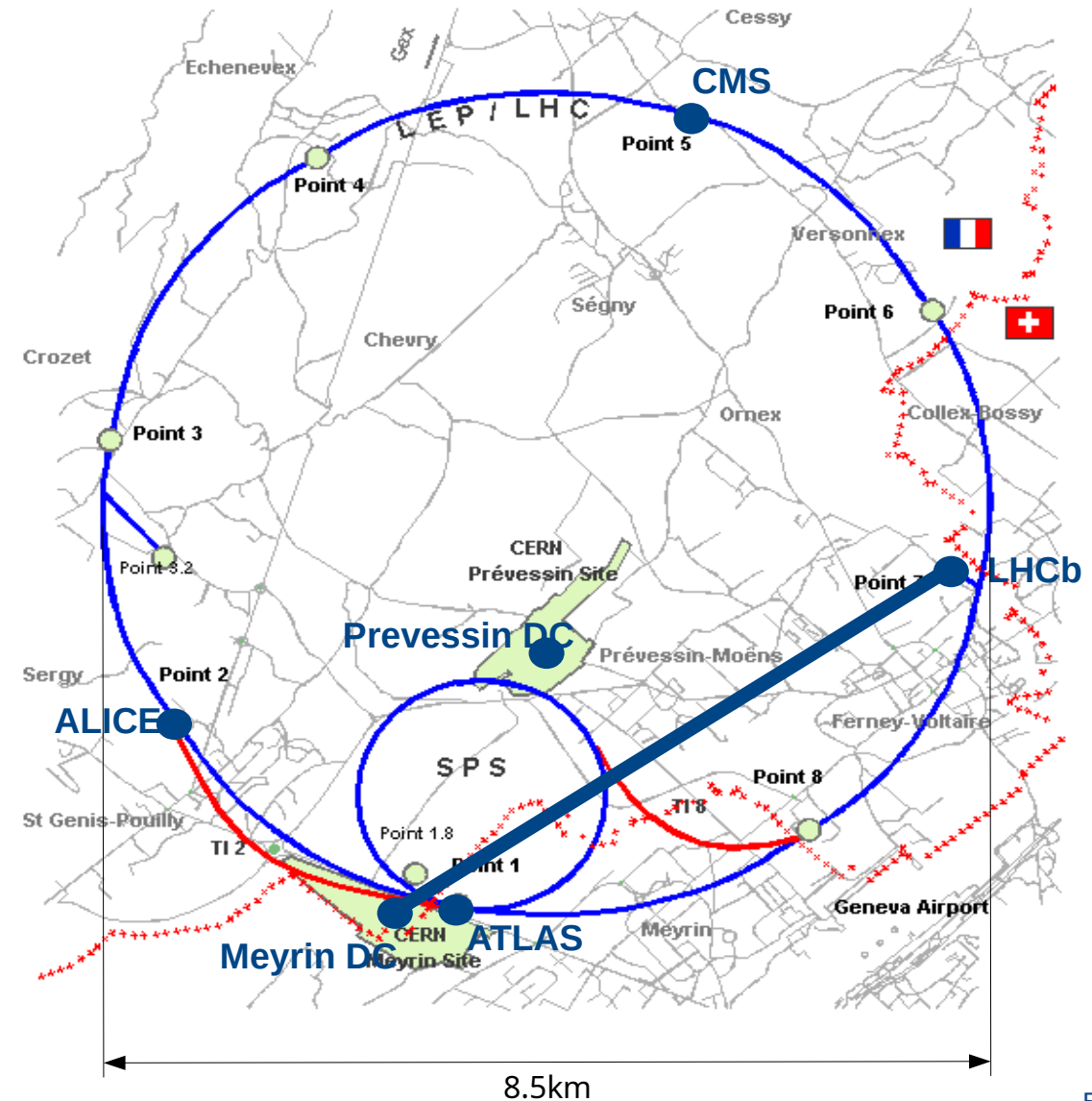
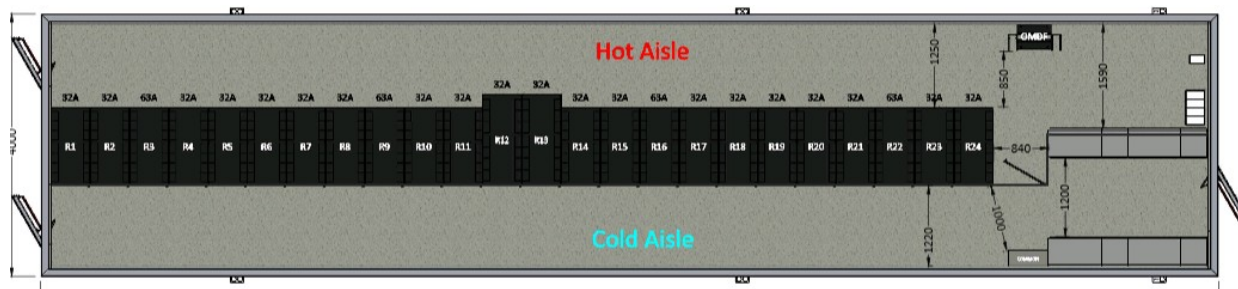
# Data centre extensions: Wigner retired

- Contract for remote data-centre in Wigner (Budapest HU) ended in December 2019
- Data drained and most recent servers repatriated
- 3x100G links decommissioned
- Servers will be re-used in Point8 DC extension (see next slide)



# Point8 (LHCb) Data-centre extension

- Two LHCb containers (out of six) will be used by CERN IT to host servers during Run3
- 24 racks per container
- Being filled with refurbished servers coming from Wigner
- 800Gbps connection to Meyrin Data-centre with DWDM PAM4 system
- To be returned to LHCb at the end of Run3



# LHCb datacentre in containers

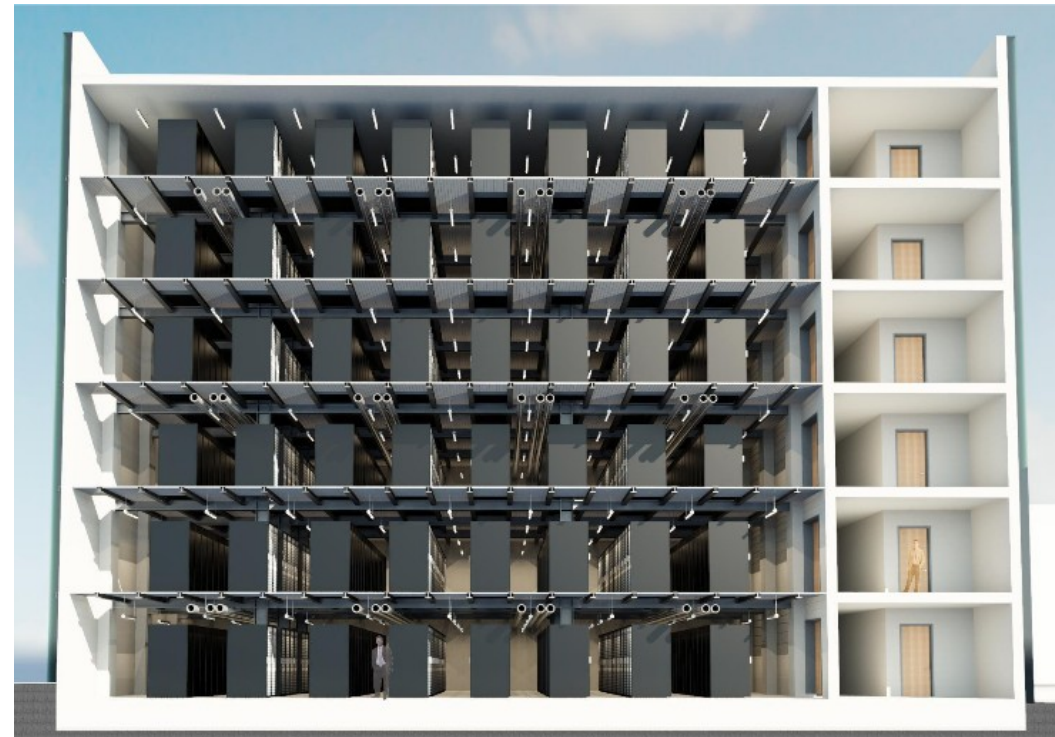


- Two containers for LHCb High Level Trigger; two containers lent to IT for Run3; two more to build

# PCC: Preveessin Computer Centre

Plan for the Construction of new Computer Centre in the CERN French site of Preveessin:

- Project fully approved by CERN management
- To be built during Run3, to be ready for Run4
- Machines-only building, inspired to GSI Green Cube



GSI Green Cube

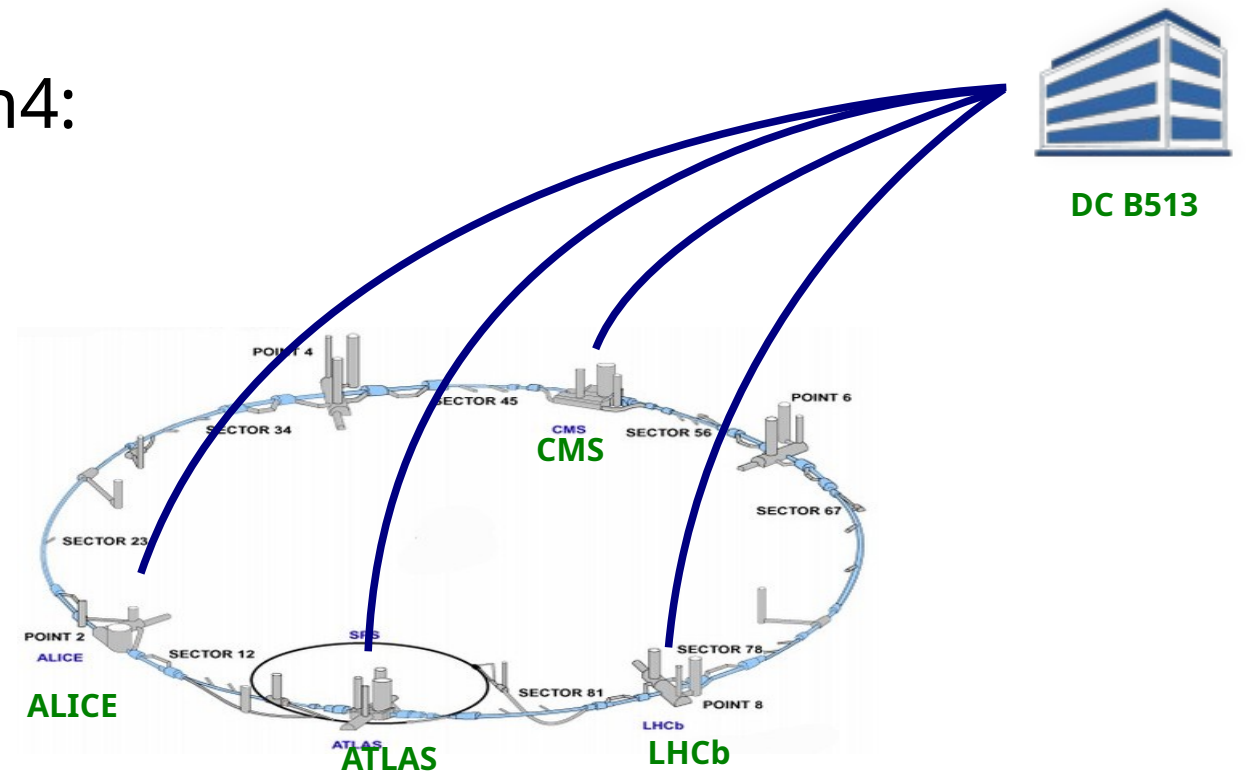
# Experiments' DAQ lines to data-centre

Received requirements for Run3:

- ALICE: 2Tbps
- LHCb: 1Tbps
- CMS: 400Gbps
- ATLAS: 200Gbps (no change)

Estimated requirements for Run4:

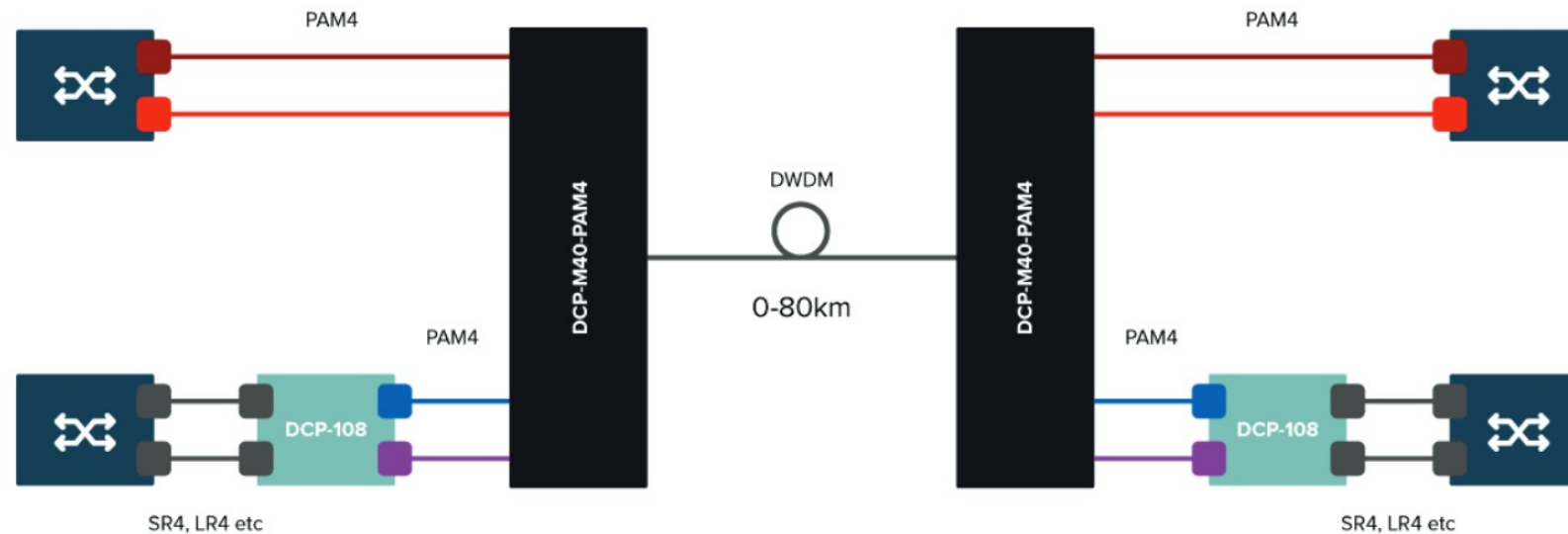
- ATLAS: 4Tbps
- CMS: 4Tbps





# Experiments' DAQ lines to data-centres

- Acquired PAM4 DWDM system from Smartoptics
- To be used for LHCb and ALICE Tbps connections



# CERNlight, CERN Open eXchange Point

- Replaced Brocade MLXE with Juniper QFX5200
- Moved 100G Geneva-Amsterdam to new SURFnet ECI system
- SURFnet has procured a better fibre Amsterdam-Geneva to be able to light 400G lambdas
- 400G test between CERN and NL-T1 to be held in 2020



# LHC new schedule

The CERN Management has presented a new calendar for future accelerator runs:

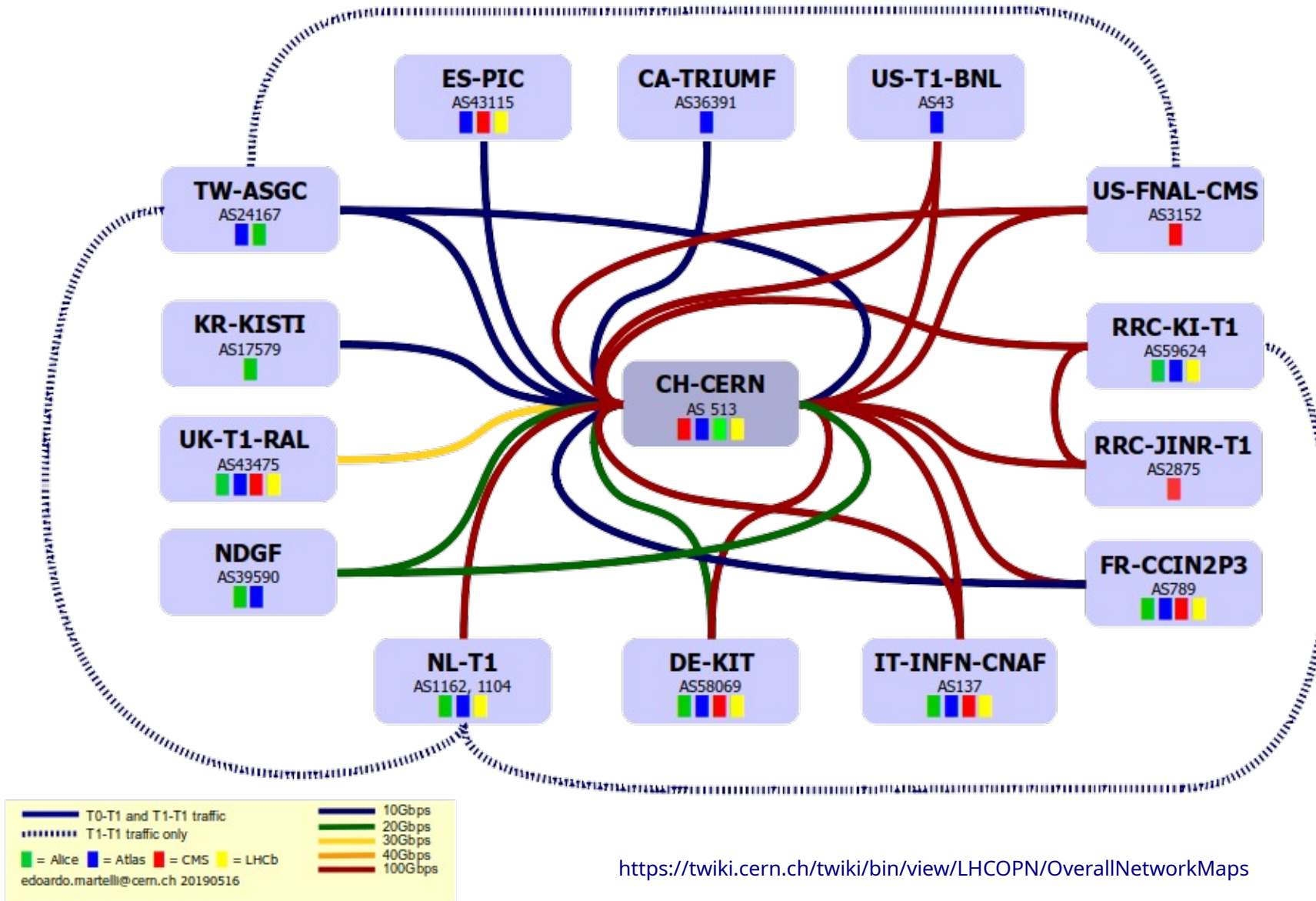
Under the new schedule, the **LHC will restart in May 2021**, two months after the initially planned date, and **Run 3 will be extended by one year, until the end of 2024**.

All of the equipment needed for the High-Luminosity LHC will be installed during Long Shutdown 3, between 2025 and mid-2027

The **High-Luminosity LHC is scheduled to come into operation at the end of 2027**.

# LHCOPN update

# LHCOPN



<https://twiki.cern.ch/twiki/bin/view/LHCOPN/OverallNetworkMaps>

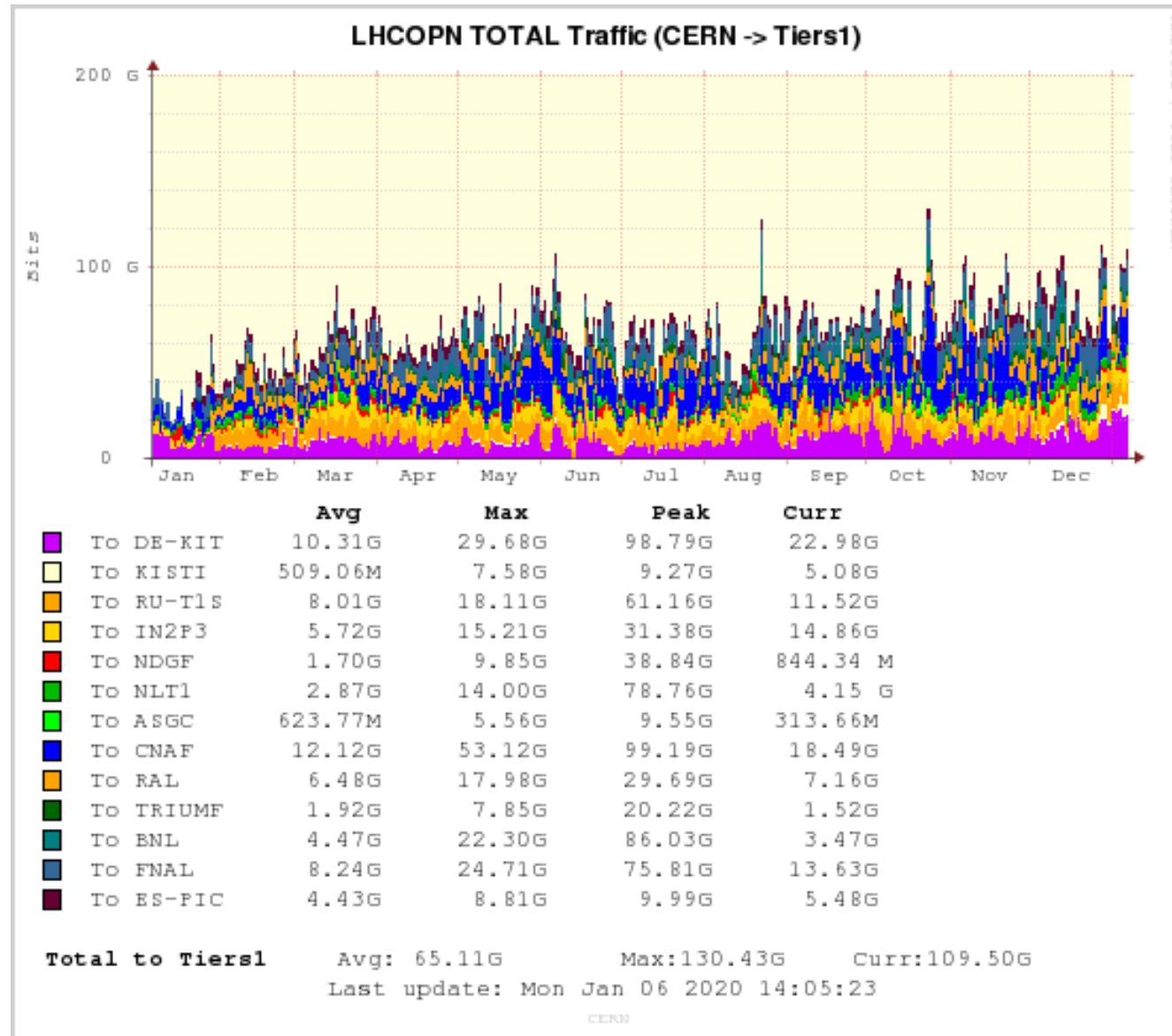
## Numbers

- 14 Tier1s + 1 Tier0
- 12 countries in 3 continents
- Dual stack IPv4-IPv6
- 1Tbps to the Tier0
- Moved ~256 PB in the last year (+54% compared to last year of Run2)

# LHCOPN last year deployments

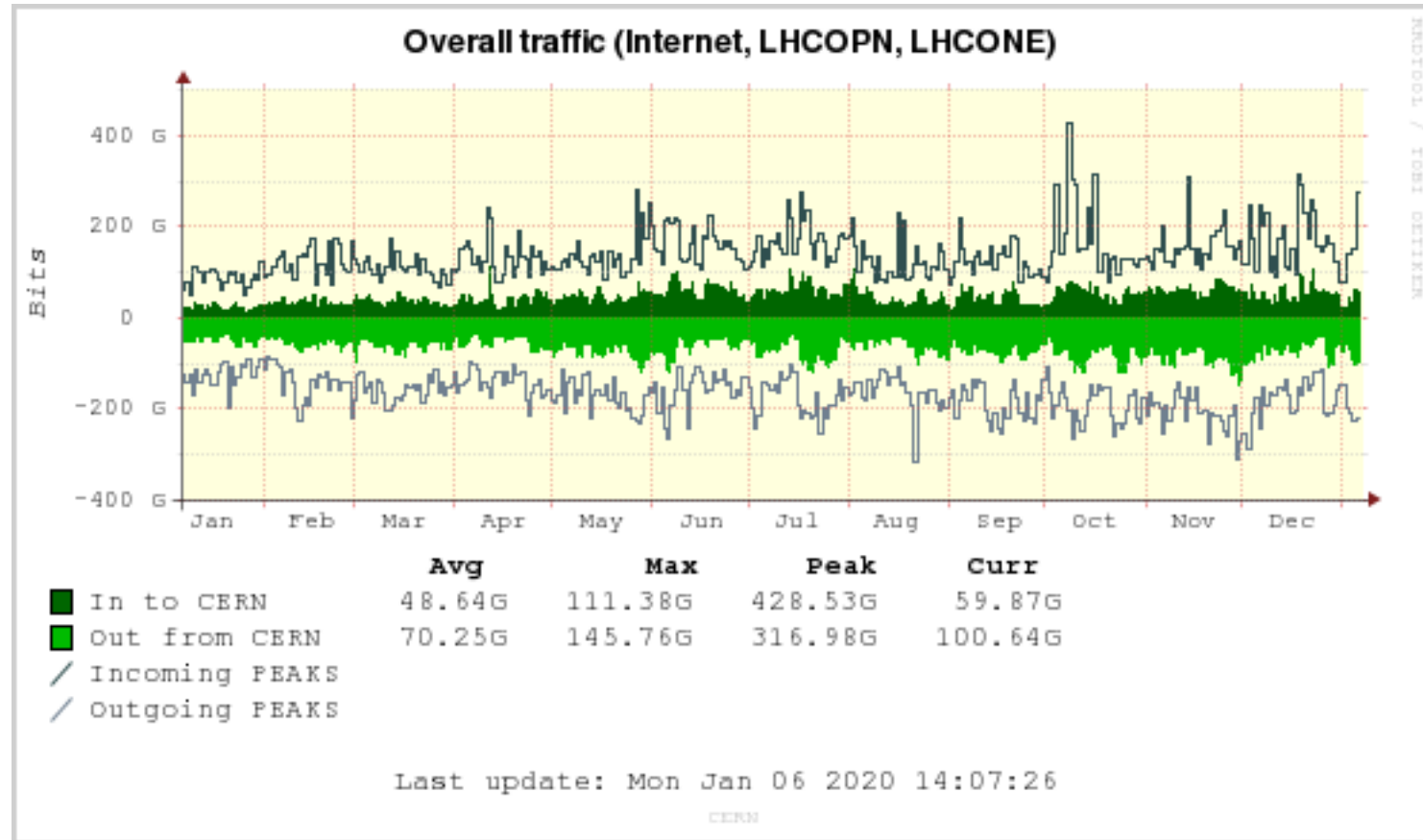
- **NL-T1**: primary link upgraded to 100Gbps
- **RRC-T1s**: primary and secondary links upgrade to 100Gbps
- **IT-INFN-CNAF**: primary and backup links upgraded to 100Gbps
- **DE-KIT**: new 100G link deployed, plan to deploy second 100G for backup
- **FR-CCIN2P3**: new 100G link deployed
- **NDGF** will upgrade to 2x100G as soon as network hardware available in Geneva (currently 4x10G)
- **ES-PIC** and **UK-RAL**: will deploy 100G link for Run3
- **CH-CERN**: legacy Brocade MLXE border routers retired. All LHCOPN and LHCONE links now connected to two Juniper QFX10002

# LHCOPN traffic - last 12 months



Ref: <https://netstat.cern.ch/monitoring/network-statistics/ext/?q=LHCOPN&p=LHCOPN&mn=00-Total-Traffic&t=Yearly>

# CERN total traffic – last 12 months



Ref: <https://netstat.cern.ch/monitoring/network-statistics/ext/?q=CERN&p=EXT&mn=01-Total-Internet-traffic&t=Yearly>



*Questions?*

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