



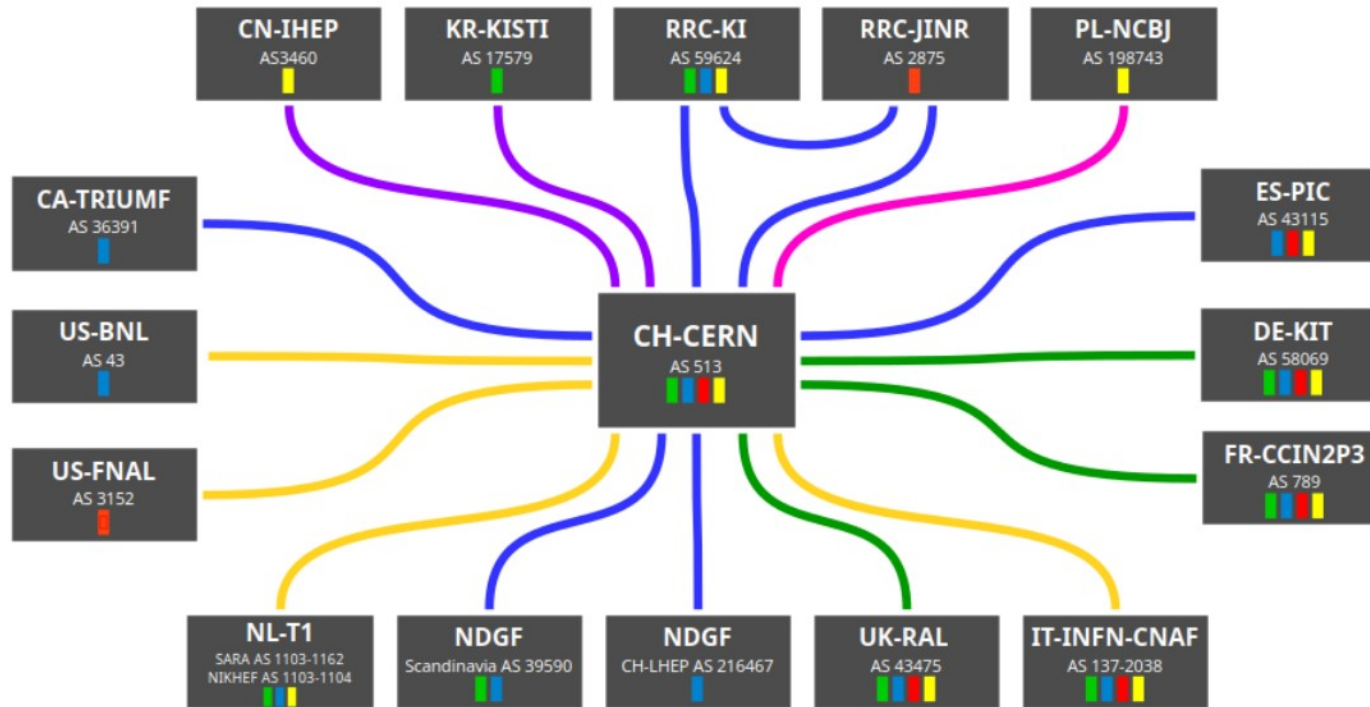
LHCOPN update

LHCOPN meeting #53, IHEP Beijing CN

9th October 2024

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LHCOPN



Line speeds:

- 20Gbps (purple)
- 10Gbps (magenta)
- 100Gbps (blue)
- 200Gbps (green)
- 400Gbps (yellow)
- 800Gbps (red)

Experiments:

- Alice (green)
- Atlas (blue)
- CMS (red)
- LHCb (yellow)

Last update:

- 20241003
- edoardo.martelli@cern.ch

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

Numbers

- 17 sites for 15 Tier1s + 1 Tier0
- 14 countries in 3 continents
- 2.88 Tbps to the Tier0



LHCOPN latest news

IT-INFN-CNAF:

- Soon ready to move to new datacentre. The DCI connections will be upgraded to multiple 400Gbps by then

US-BNL:

- Now with 400Gbps capacity for LHCOPN

New Serbian CMS Tier1:

- The Vinča Institute of Nuclear Sciences in Belgrade is working to become a CMS Tier1. They have a datacentre in Kragujevac, south of Belgrad.
- Working with AMRES and GEANT for the LHCOPN and LHCONE connectivity

LHCOPN latest news

PL-NCBJ:

- LHCOPN link upgraded to 40Gbps; provided by GEANT over a 100Gbps connection.

NDGF:

- NORDUnet is upgrading its routers at CERN and we'll soon be able to provide 100Gbps redundancy to NDGF

US-FNAL:

- Aggregate WAN capacity upgraded to 2.4Tb/s
- LHCONE capacity now 1.6Tb/s, with LHCOPN capacity remaining at 400Gb/s (limited by trans-Atlantic link(s))

LHCOPN latest news

CH-CERN:

- Tony Cass will retire soon and is no longer at the head of the IT-CS group.
A very big Thank you for his contribution to LHCOPN and LHCONE over many years
- Eric Grancher, the new IT-CS group leader, will join our next meeting

Latest news

Other Tier1s

- [input from the audience]

LHCOPN Traffic – last 12 months

Numbers:

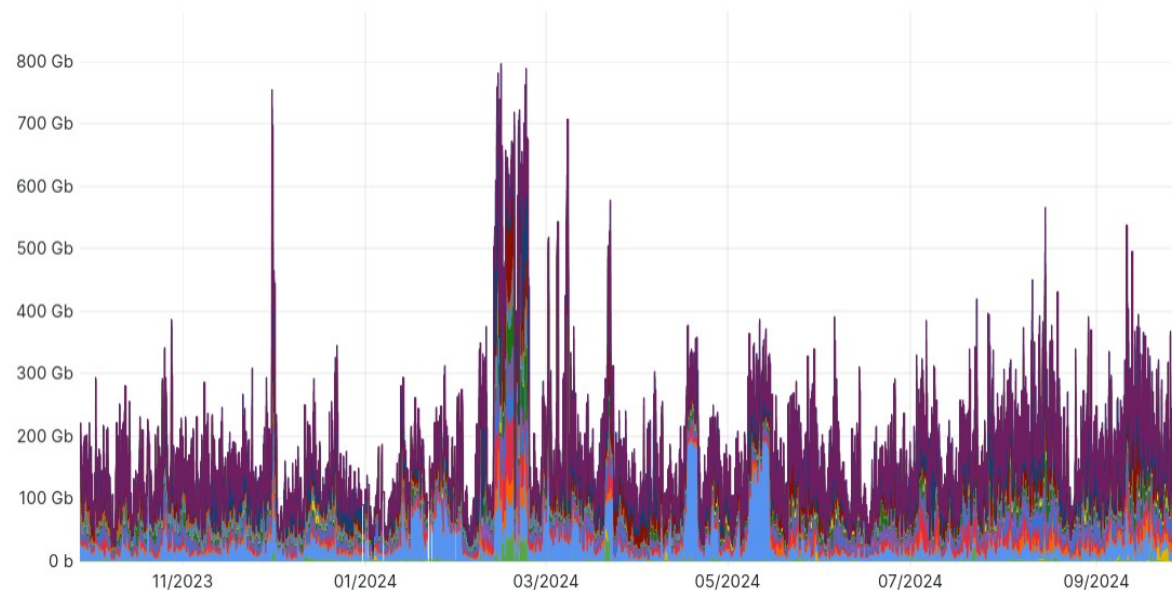
Moved ~658 PB in the last 12 months

+22% compared to previous year (540 PB)

Peak at ~800Gbps (during DC24)

Recent production peak at 570 Gbps

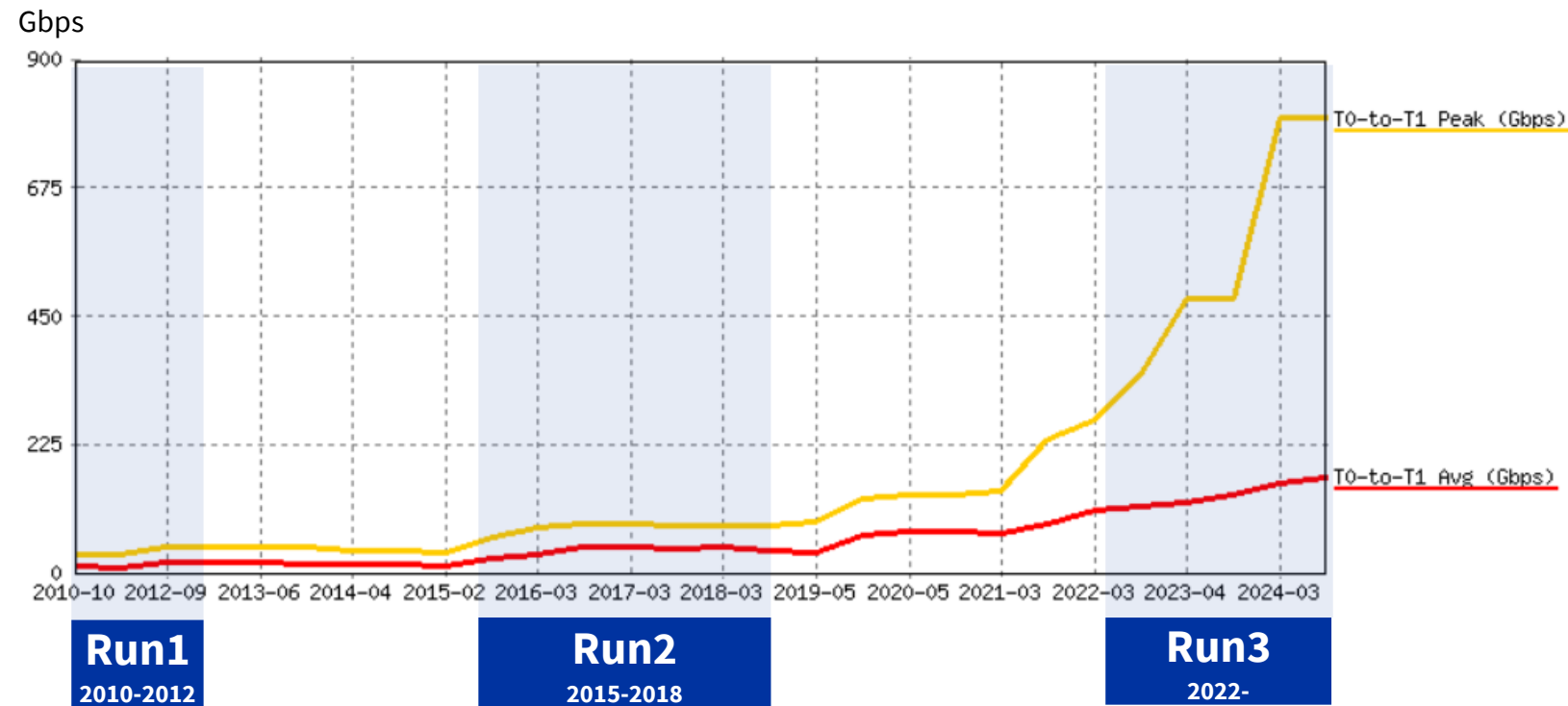
LHCOPN Total Traffic (CERN → T1s)



Name	Mean	Max
Outgoing CA-TRIUMF	6.94 Gb	69.9 Gb
Outgoing CN-IHEP	657 Mb	22.1 Gb
Outgoing DE-KIT	42.5 Gb	202 Gb
Outgoing ES-PIC	7.53 Gb	97.2 Gb
Outgoing FR-IN2P3	20.1 Gb	169 Gb
Outgoing IT-INFN-CNAF	14.3 Gb	105 Gb
Outgoing KR-KISTI	1.38 Gb	18.6 Gb
Outgoing NDGF	11.1 Gb	110 Gb
Outgoing NL-T1	14.3 Gb	545 Gb
Outgoing-PL-NCBJ	1.58 Gb	17.4 Gb
Outgoing RU-T1	8.00 Gb	73.9 Gb
Outgoing UK-RAL	2.81 Gb	36.0 Gb
Outgoing US-BNL	18.7 Gb	148 Gb
Outgoing US-FNAL	17.6 Gb	204 Gb
Total	167 Gb	797 Gb



LHCOPN: traffic growth



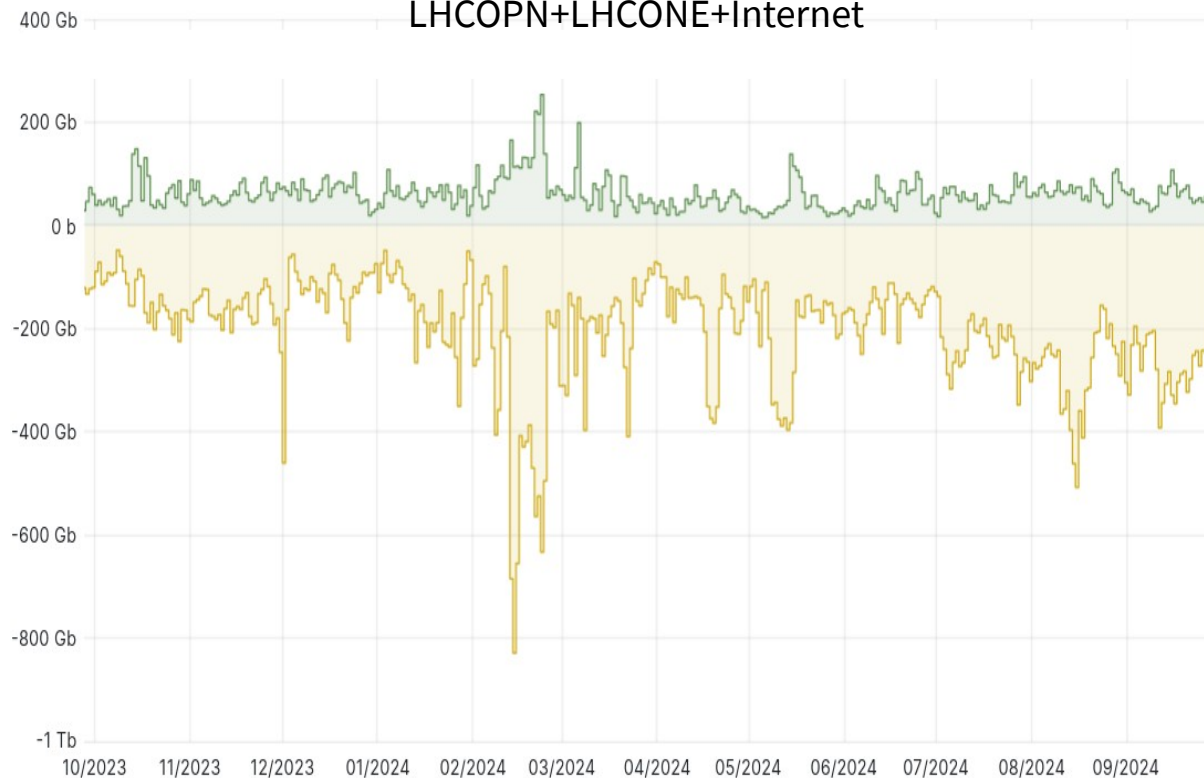
Run1: 2010-12
LS1: 2013-14
Run2: 2015-18
LS2: 2019-21
Run3: 2022-26

Y-Axis: Gbps - Average bandwidth of previous 12 months



CERN total traffic

LHCOPN+LHCONE+Internet



	max	avg
Internet IPv4 In	7.40 Gb	2.11 Gb
Internet IPv4 Out	95.6 Gb	13.6 Gb
Internet IPv6 In	20.8 Gb	1.25 Gb
Internet IPv6 Out	41.1 Gb	3.92 Gb
Internet Total In	27.7 Gb	3.36 Gb
Internet Total Out	95.6 Gb	17.5 Gb
WLCG IPv4+IPv6 In	254 Gb	59.3 Gb
WLCG IPv4+IPv6 Out	827 Gb	197 Gb
Total In	254 Gb	61.0 Gb
Total Out	827 Gb	202 Gb

Numbers:

Sent out ~796 PB
in the last 12
months

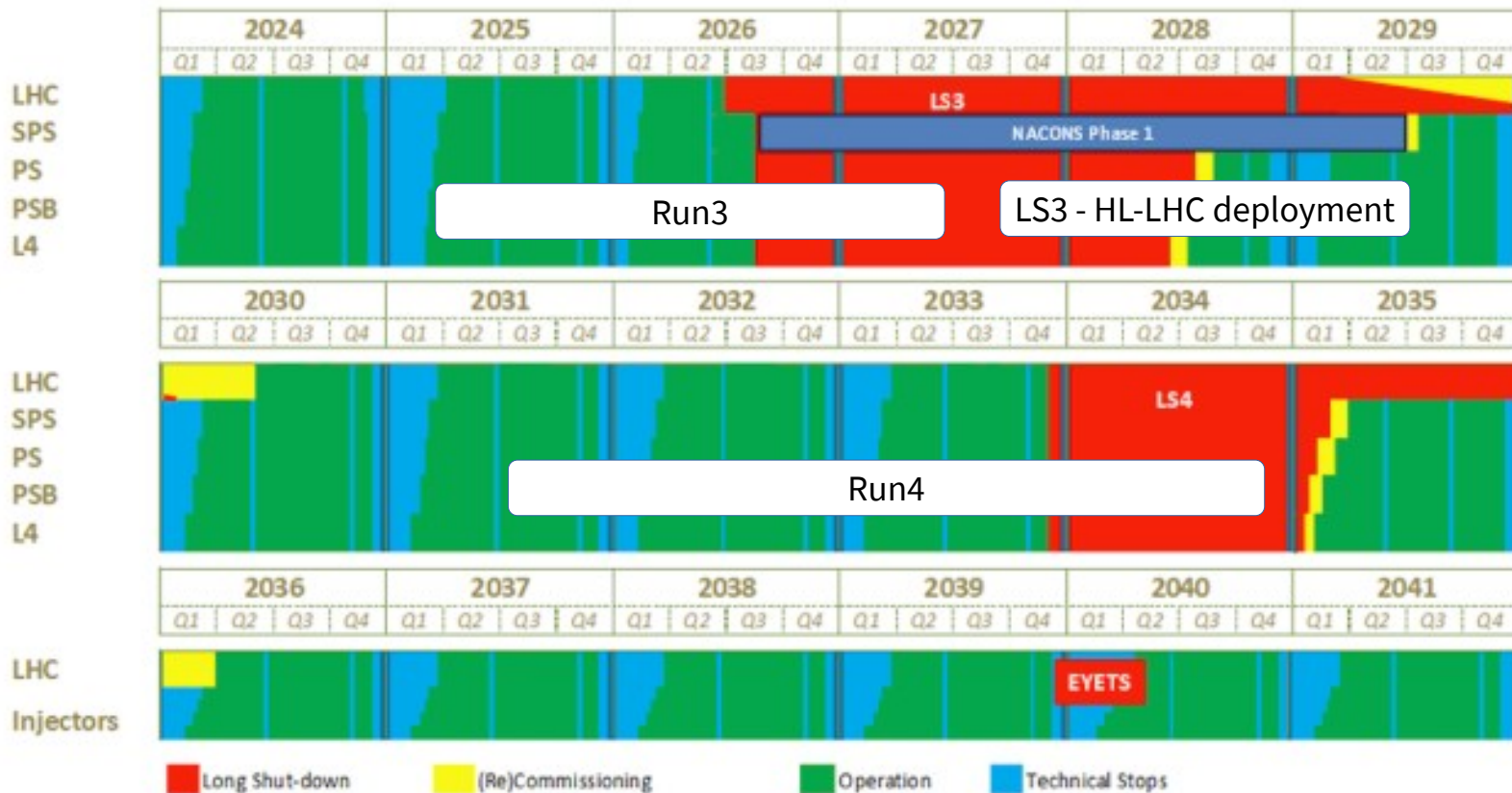
+36% compared
to previous year
(583PB)

Ref: https://monit-grafana.cern.ch/d/cScW82Tnz/00-overview?orgId=14&var-source=long_term&var-bin=1d&from=now-1y&to=now



New LHC schedule

Long Term Schedule for CERN Accelerator complex

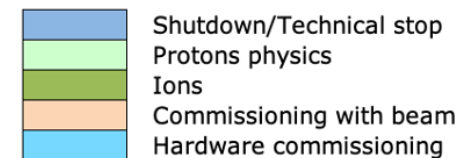
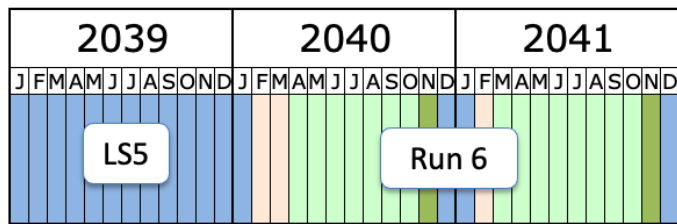
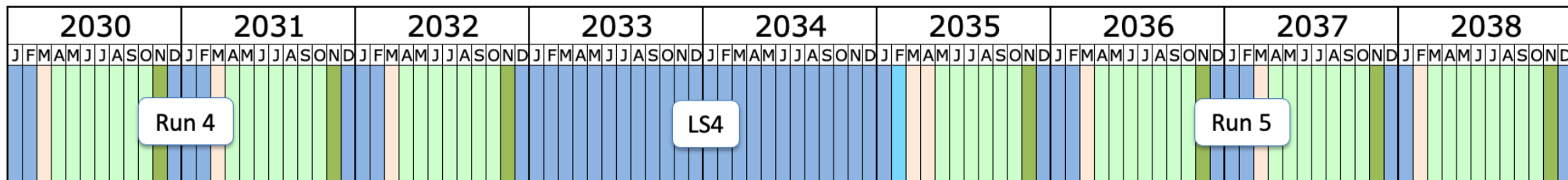
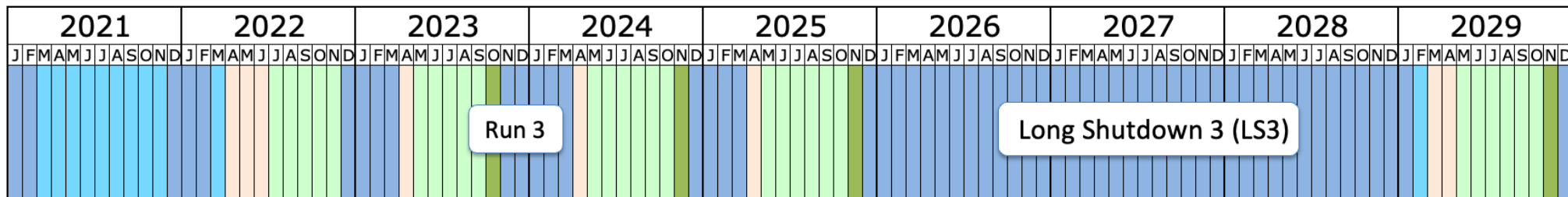


LS3 now scheduled to begin July 2026, 8 months later than planned

High-Luminosity LHC (**Run4**) will start June 2030, 14 months later than planned

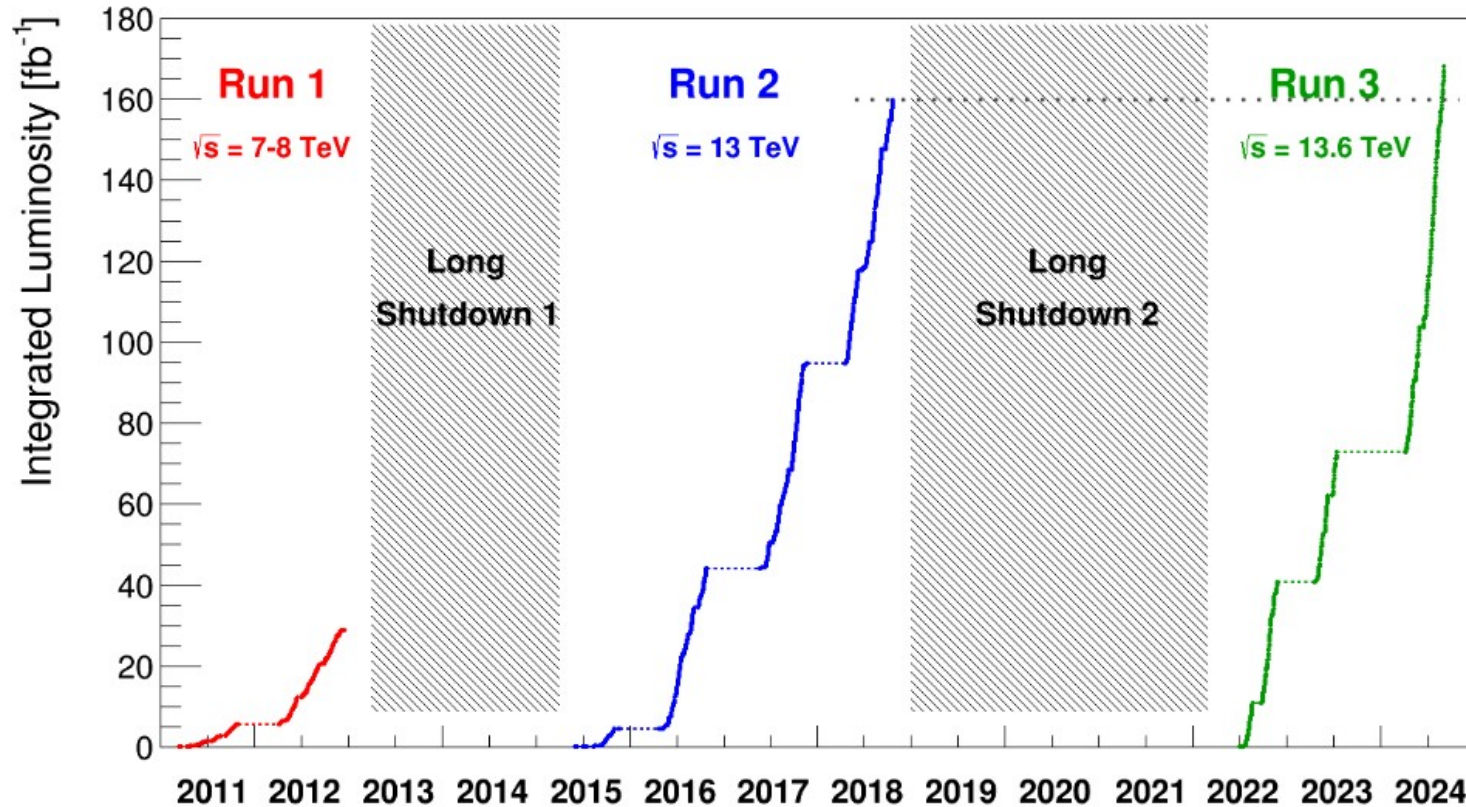
LS4 is delayed one year

Old LHC schedule



Last update: April 2023

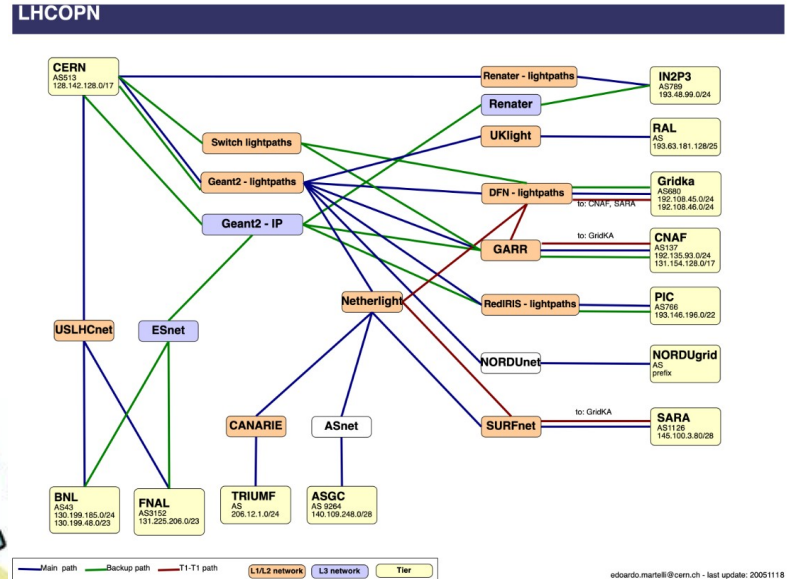
LHC performances: exceeding Run2



Soon 20 years of LHCOPN

LHCOPN was started in 2005

Next year we should celebrate the
20th anniversary



Questions?

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