



LHCOPN Celebrating 20 Years

Erik-Jan Bos (now NORDUnet, SURFnet back then)
Manchester, UK & Online – 18 March 2025



LHCOPN

Musings from the Architecture Group

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Musings from the Architecture Group & other ramblings

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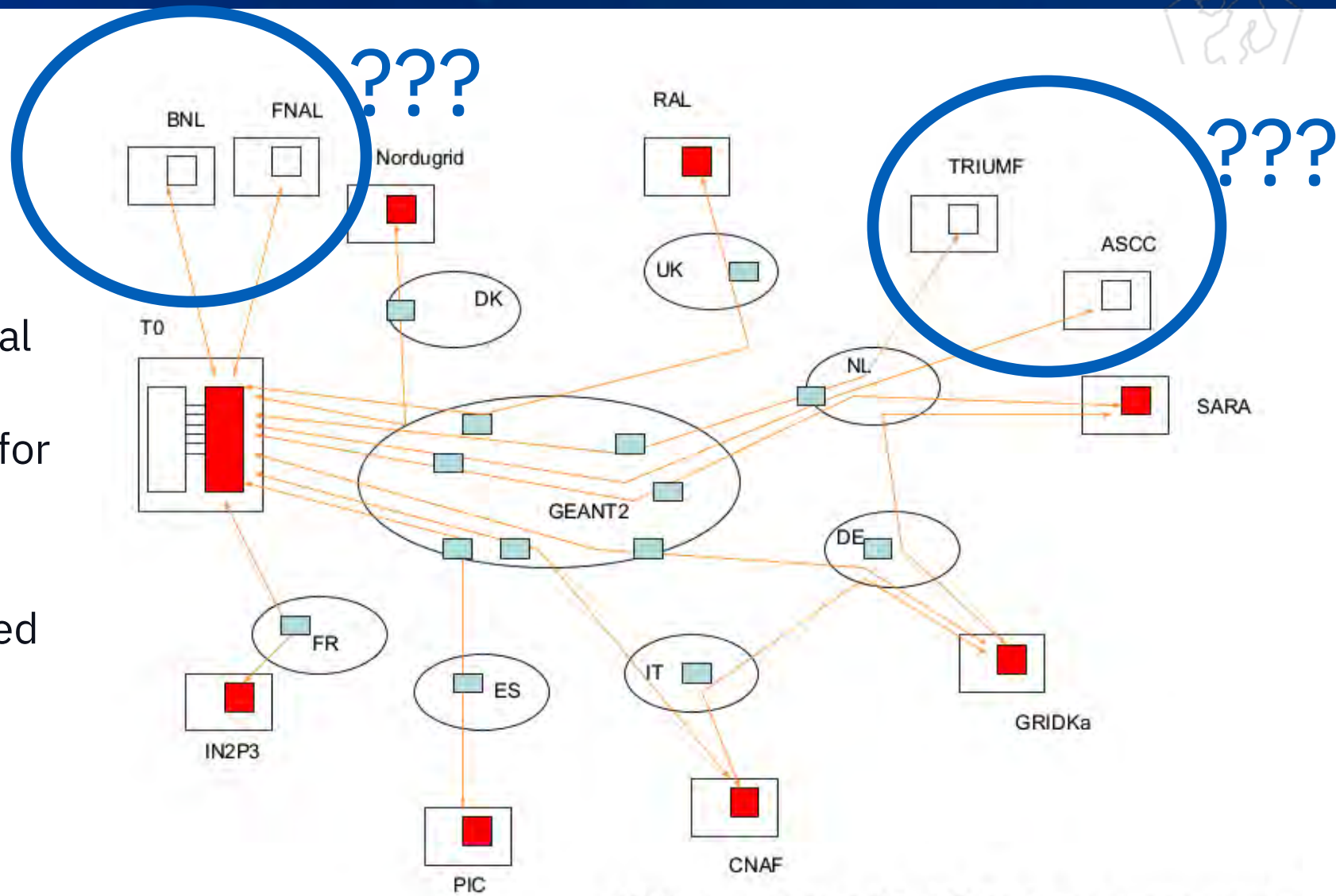


First thoughts, from 2005

- Started with fierce discussions, mostly politically fuelled
 - Creating an advanced, future proof solution was not front & centre
 - Technology seemed less interesting
 - Cost even less...
- Was it about creating an advanced architecture for the WLCG or was it about exercising control over the network?
- One thing seemed not too difficult: Name selected in 2005
- The **O**ptical **P**rivate **N**etwork for the **L**arge **H**adron **C**ollider
 - “LHCOPN”

The Red Boxes

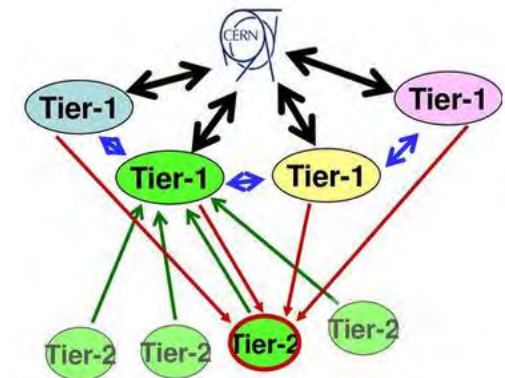
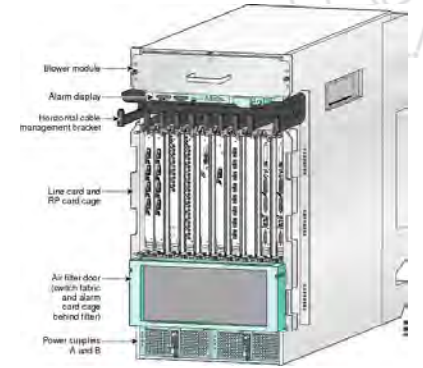
- At the heart of the political ‘solution’
- “LHC NOC”, with no role for CERN
- Focus on EU sites only
- “Cost of Red Boxes passed onto LHC project via the NRENs”



2006 view of the LHC-OPN primary connections

The 2005 zeitgeist

- Routers were very expensive
 - Worries about the IP routing tables growing out of control
 - Worries about the cost of high-speed interfaces
 - Worries about routers getting even more expensive
- GLIF started in 2001
 - "Route where you must, switch where you can"
- LHC Tier0 → Tier1 traffic a constant flow
 - Does not need N routers in the path
- Hence, a 'lightpath' solution was proposed
 - Routers at the edges, switches in the path, e.g. GXPs
 - KISS!



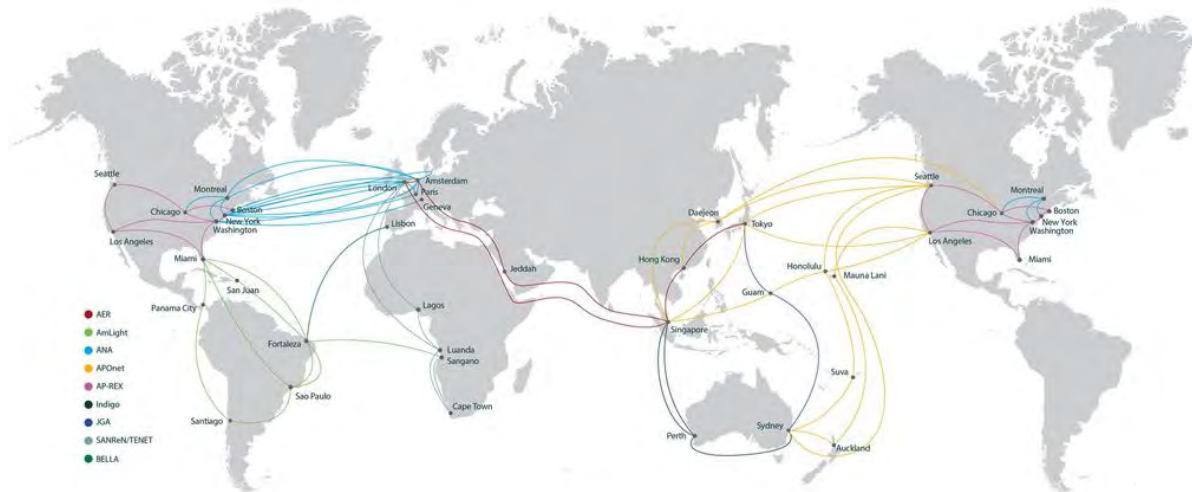


The Global R&E Network (GREN)





LHCOPN rides mostly on the GREN



- The GREN consists of individual systems
 - AER
 - AmLight
 - ANA
 - APOnet
 - ...
- Each system in itself is resilient
- The systems jointly have even more resilience
- But there are ‘choke points’
 - ”Magnets for disaster”



Resilience is key!



- Some existing submarine cable routes are a concern
 - 90% of Europe – Asia traffic goes through Red Sea
 - Rubymar sank
 - Broke three submarine cables, incl. AAE-1
- Adding new routes adds resilience to the global Internet
- An example is Polar Connect
 - Aims at creating a new transport corridor Europe – East Asia
 - Complementary to existing Red Sea cables
 - Shortest possible path guarantees reduced latency & improved connectivity



LHCOPN is at the heart of the WLGC

- Creating LHCOPN was a group effort & a great journey
- Awesome to see LHCOPN thriving, after 20 years
- Acknowledging the leadership of David Foster!
- Wishing you all a fruitful 54th meeting in Manchester





Thank You!