DISASTER RECOVERY AND OPERATIONAL CONTINUITY

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## WHAT IT MEANS TO US

- Infrastructure
  - Power
  - Cooling
- Critical Systems
  - Email
  - Network
  - Data Access
  - Cyber Security
- Disaster Management
  - Protocols
  - Remote Access
  - Recovery

DISASTER RECOVERY

- Man-made
  - 2003 Blackout
  - 2005 accidental activation of EPO switch
  - 2010 accidental failure of ATS during UPS maintenance
- Natural disasters
  - 2011 Hurricane Irene
  - 2012 Hurricane Sandy
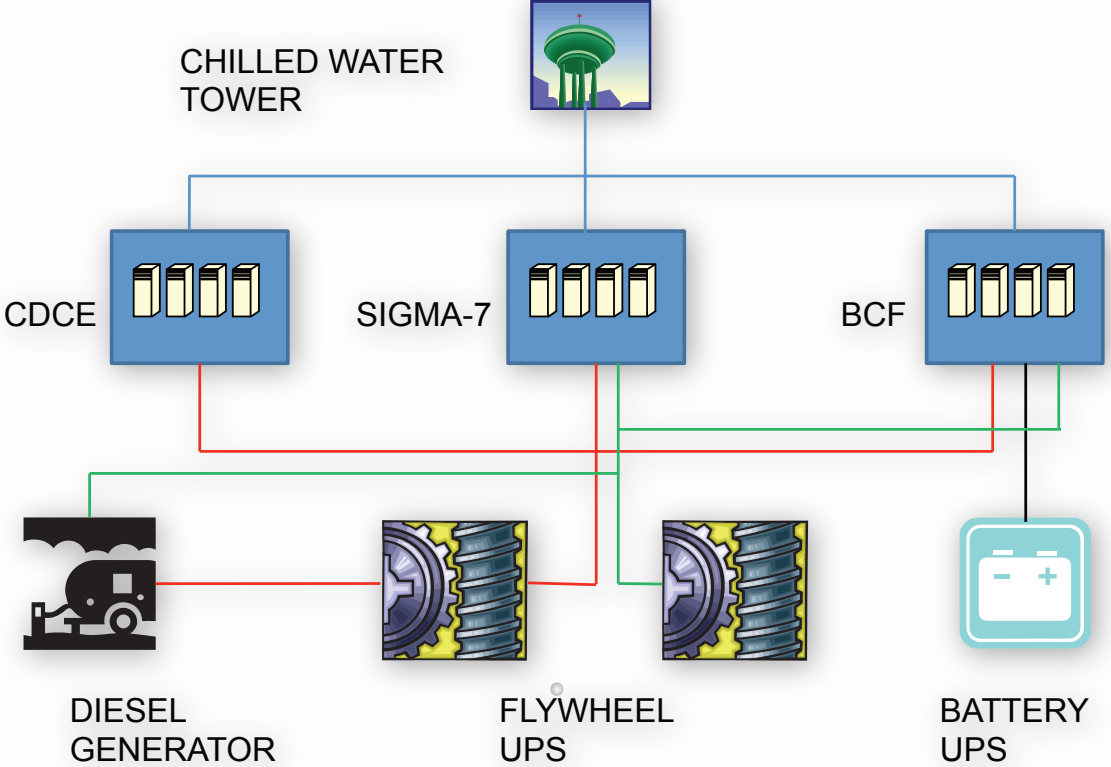 - 2013 Superstorm Nemo

RACF

- RACF spread in 3 distinct physical areas
  - BCF (~5000 ft² or 465 m²) since 1996
  - Sigma-7 (~2000 ft² or 185 m²) since 2008 – converted lab space
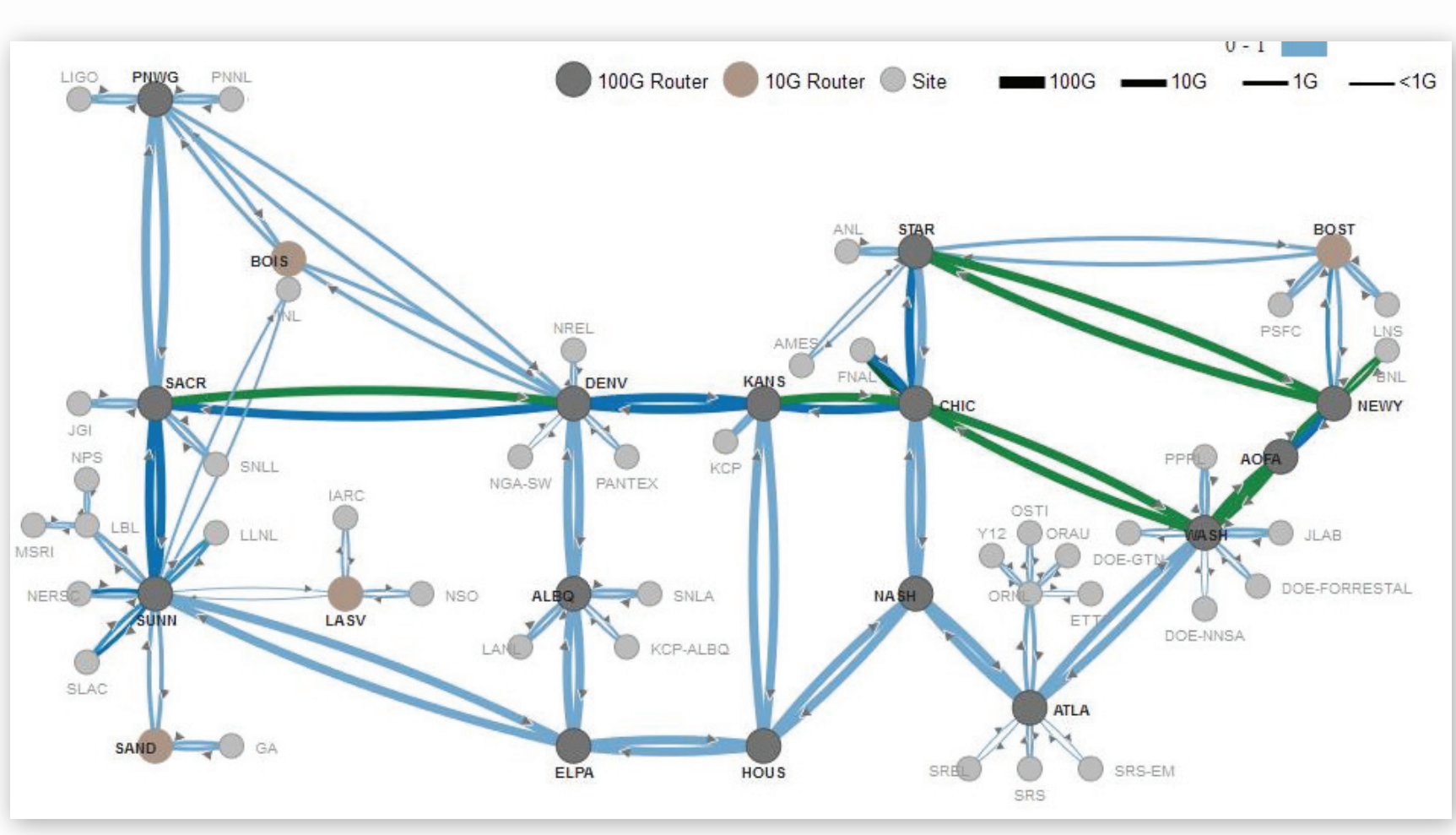 - CDCE (~6000 ft2 or 560 m2) since 2009 – new building
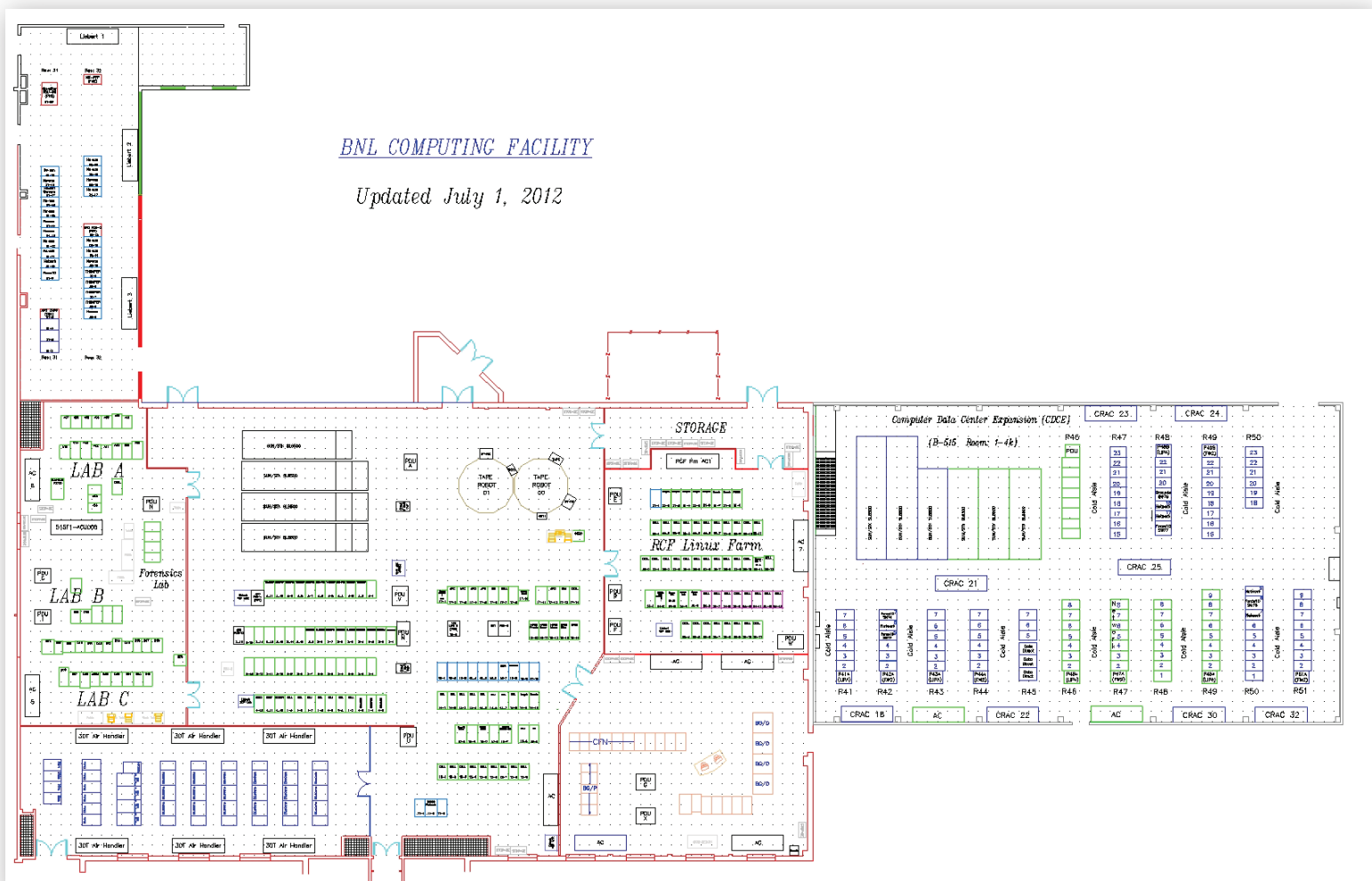
POWER AND COOLING

- Redundant power (utility + UPS) for racks housing critical services
  - Email
  - Remote Access
  - Batch
  - Storage Services (NFS, AFS, HPSS)
- Service redundancy
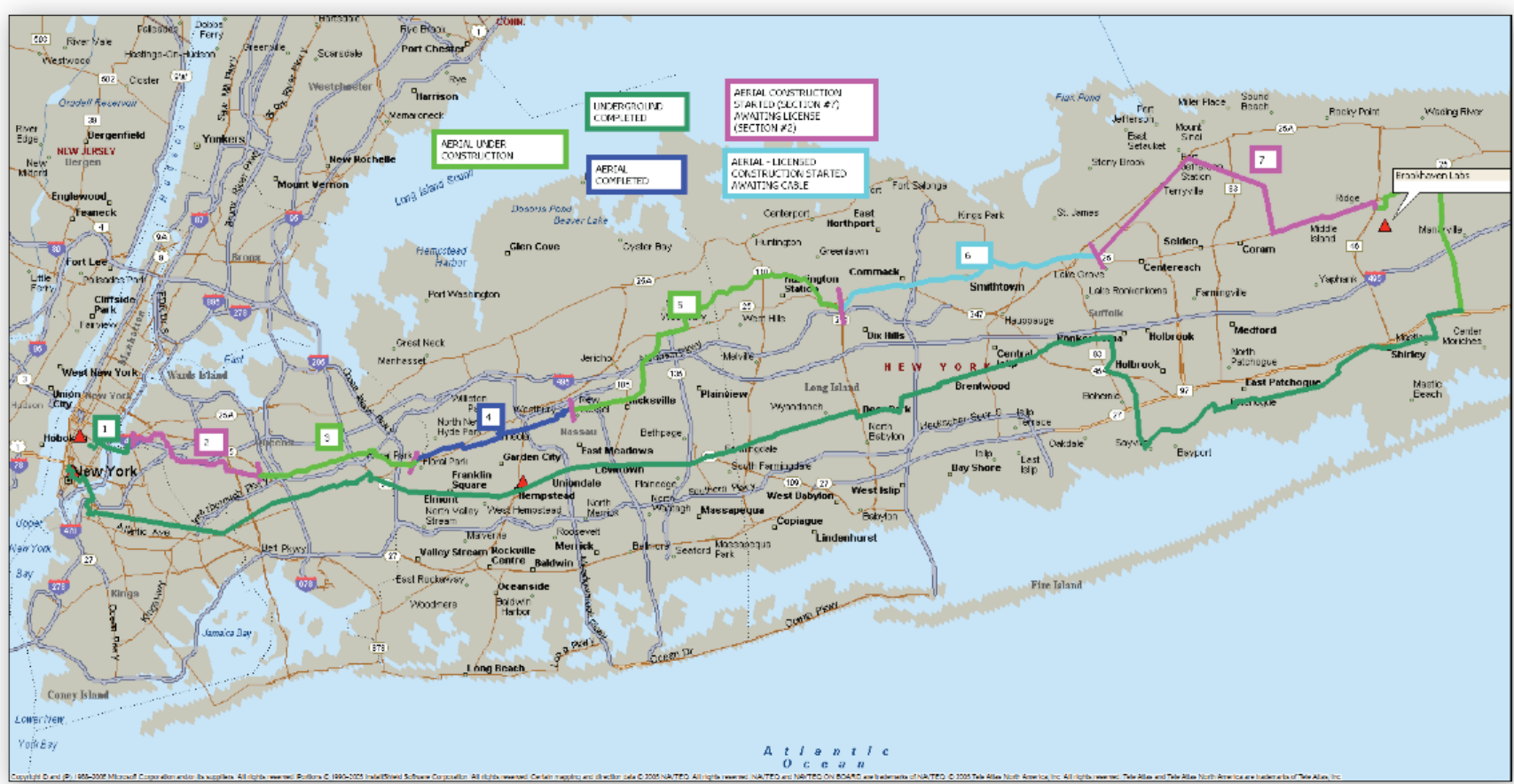 - Physical (cold and hot spares)
  - Virtual

NETWORK

- Network
  - ESNET provides multiple paths to WAN
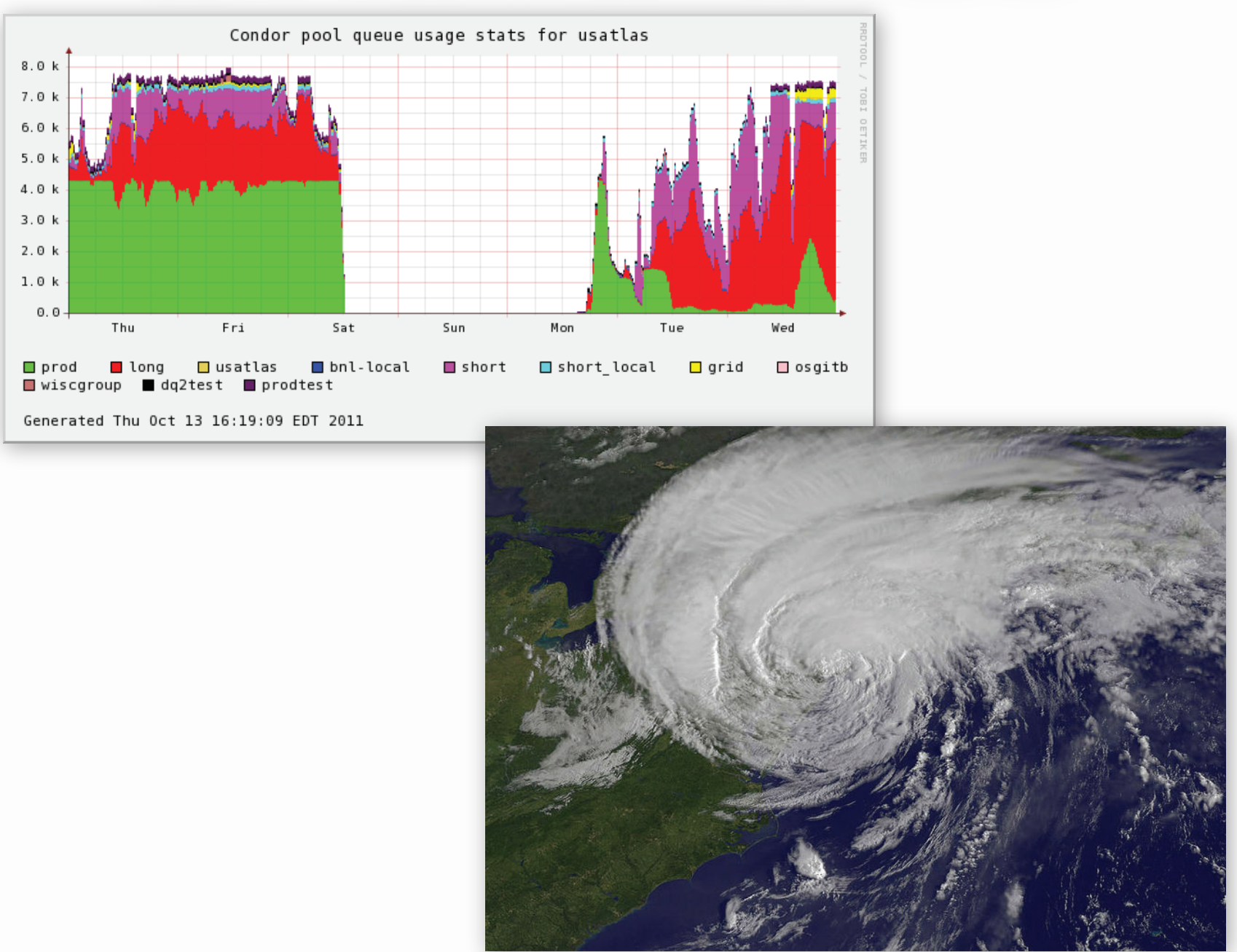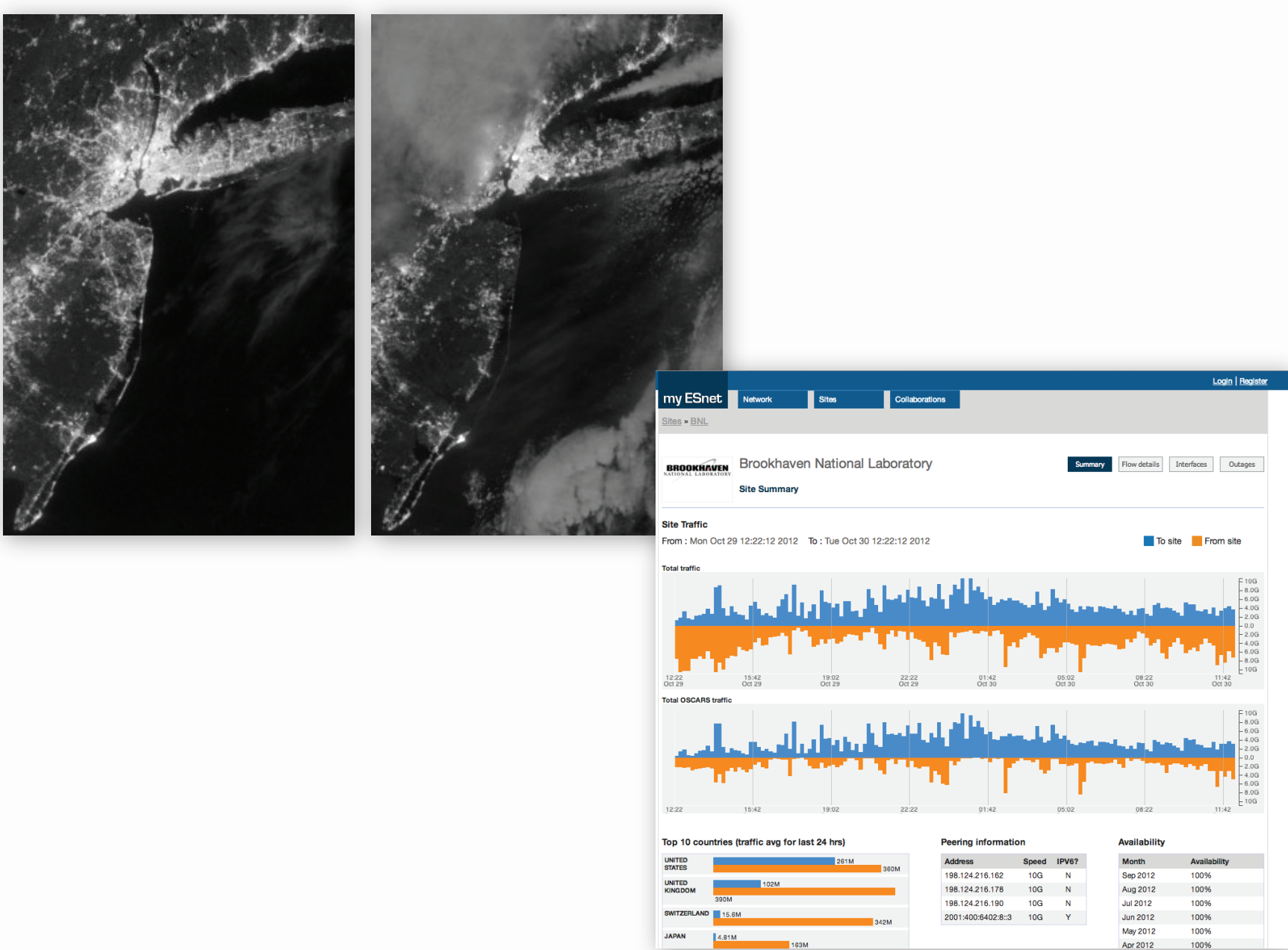 - Redundant paths to LHCOPN

LIMAN DIVERSE FIBER PATHS

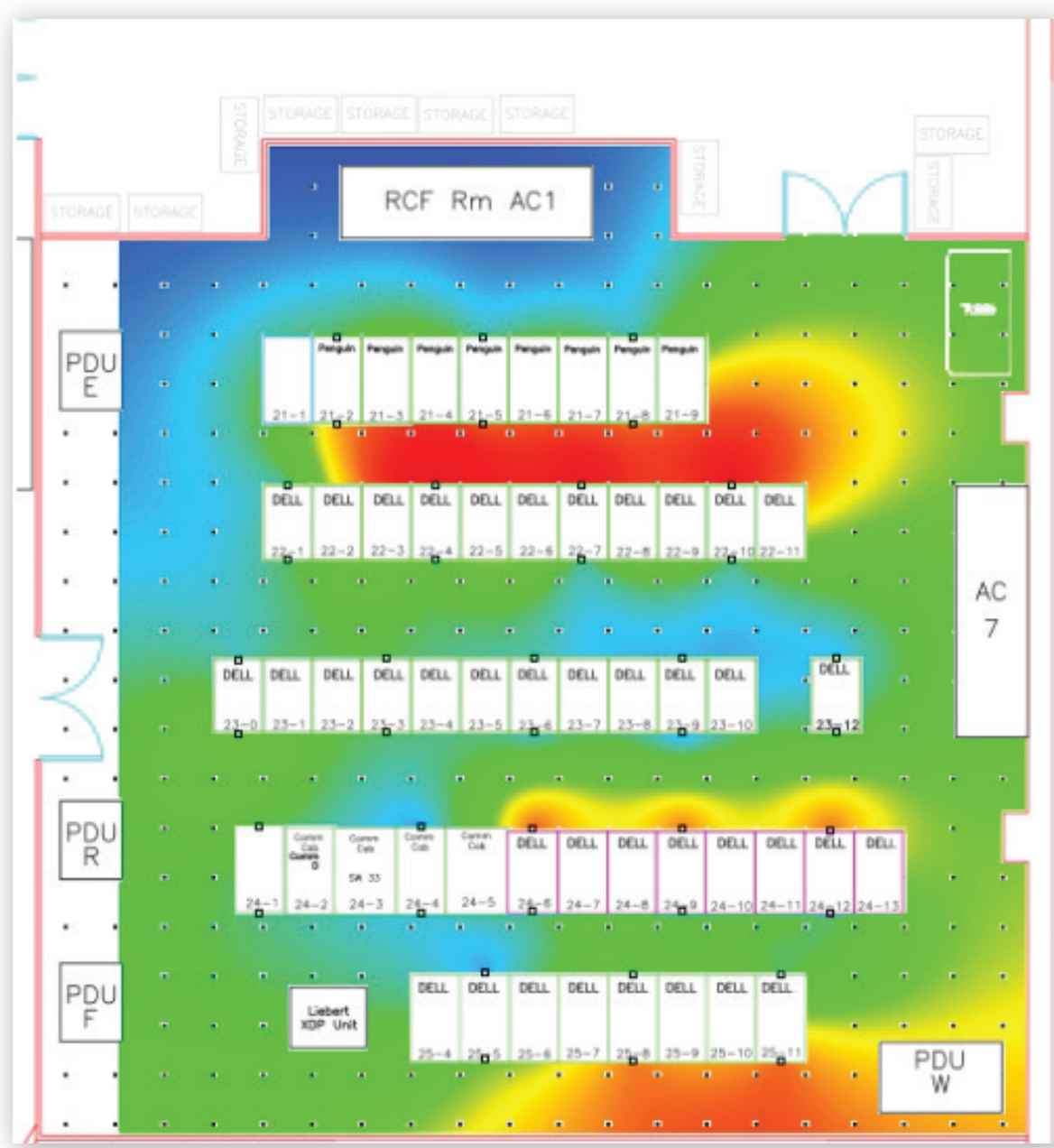## 2003 BLACKOUT

2011 HURRICANE IRENE

2012 HURRICANE SANDY

2013 SUPERSTORM NEMO

SYNAPSENSE

WHAT WE LEARNED

- Remote Access
  - Essential for staff to keep facility operational
  - Connectivity options
    - Do not assume wired/wireless ethernet is available
    - Provide VPN connectivity
    - Tethering to cell phone network?
  - Do not assume all staff will have connectivity
    - Designate staff roles accordingly
  - 9 x 5 or 24 x 7 coverage are not the only models
  - Operators cover off-hours and weekends (16x7 model)
- Auto shutdown procedure
  - Tied to monitoring
  - Essential if danger of flooding or electrical fire is non-negligible

STILL TO DO

- Generator(s) for CRAC units
  - UPS only backs up data center equipment
  - Risk of overheating and electrical fire
  - Funding in place to address it partially (Sigma-7 for now)
- Remote monitoring of PDU's and CRAC units
  - Only indirect monitoring for now
  - Full deployment of Synapsense (completed Sept. 2013)

RACF