Use of Batteries in the Telecommunications Industry

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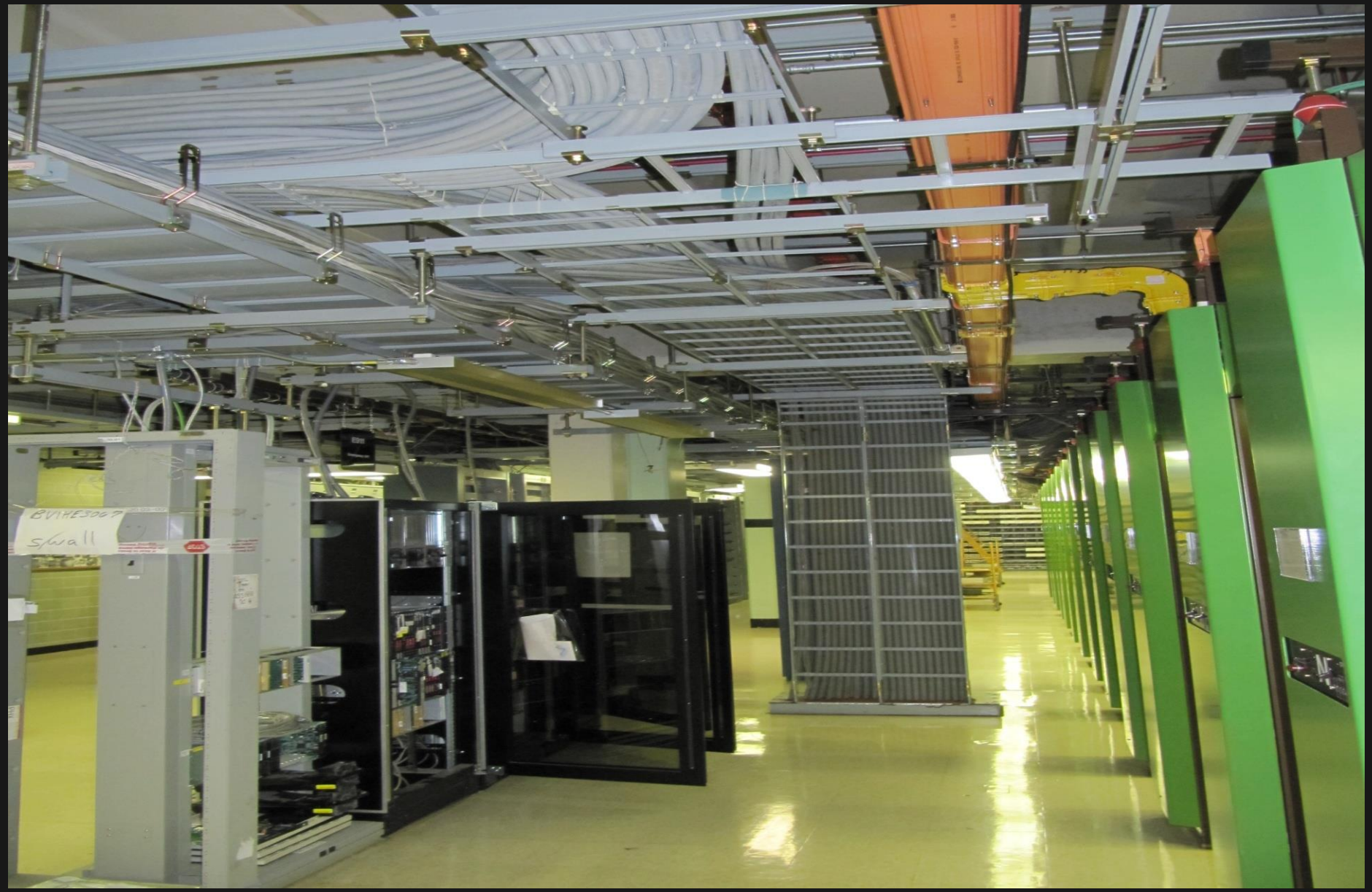
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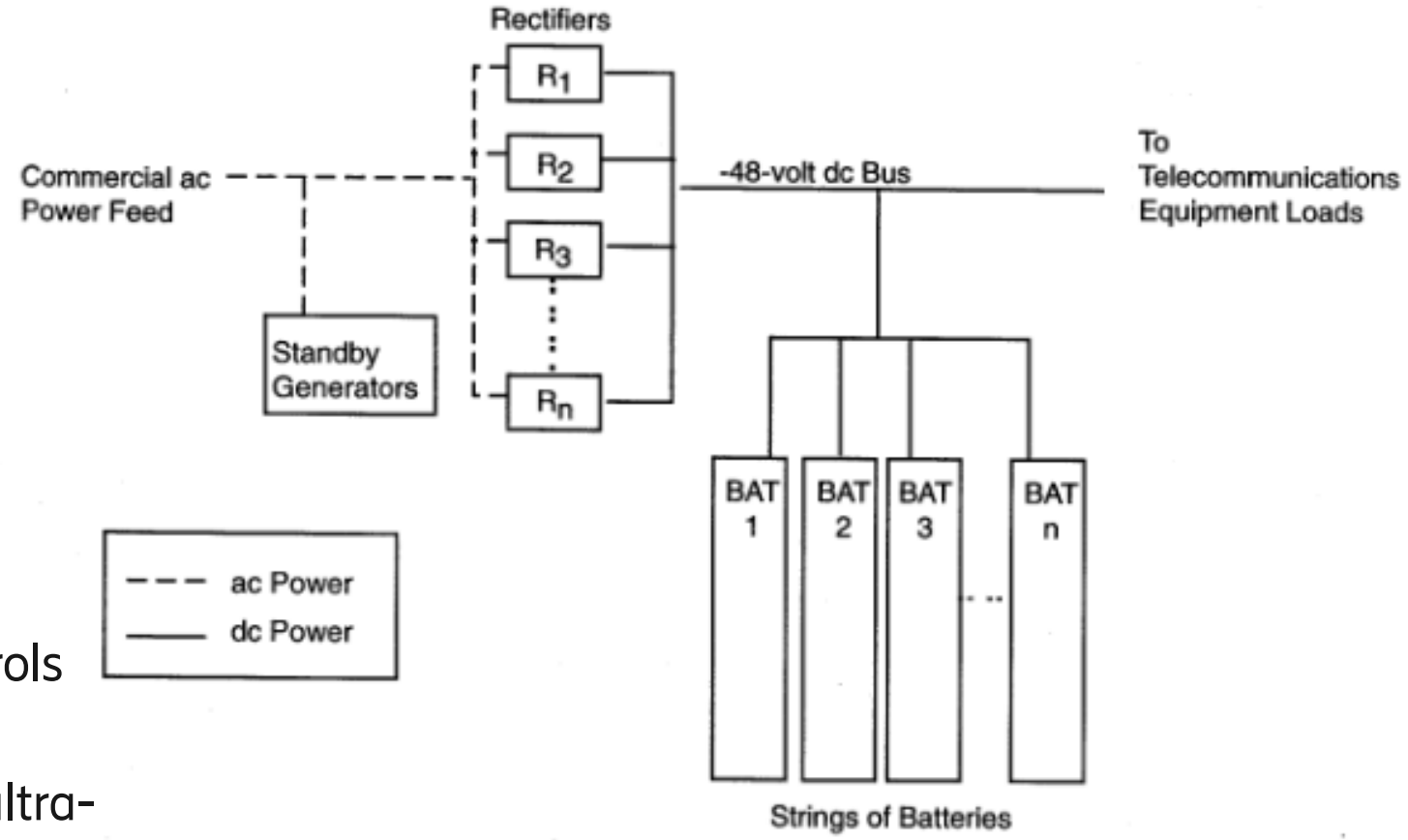
Telecom is a Very Unique Occupancy

- FCC mandated backup power
- Often older construction
- Controlled access
- No automatic fire suppression
- Fire resistant equipment
- Advanced fire detection methods
- Difficult to depower –
  no Emergency Power-Off (EPO) switch
- High installation quality
- Safe work history
- Safe dc voltages

Schematic of a Telecom Power Plant



- No moving parts
- No electronic controls
- No switches
- Safe voltage and ultra-reliable

- Data Center UPS is more complicated and higher voltage
- Output is ac not dc
- More connections
- Less reliable

Typical Telecom Power Plant Capacity

- Large telecom offices and cell sites with dedicated generators have 3 to 4 hours of battery reserve time
  - A large telecom office may have over 400 cells and 8000 gallons of electrolyte

- Smaller telecom facilities without generators have 8 hours of battery reserve time

- Data Center UPS reserve time is typically much lower:
  10 to 20 minutes to allow generator start or safe shutdown.

Standby Power versus Energy Storage Systems

- Both Telecom dc plant and Data Center UPS are considered “Standby Power”
  - Non cycling – 99% of time in “float condition”
  - Batteries only used when commercial power is lost

- Energy Storage Systems (ESS)
  - Often used for cyclic applications (solar or wind storage)
  - Undergo routine charge and discharge cycles
  - Could be at utility or end-user location

Traditional Code Treatment of Stationary Storage Batteries

- Battery rooms have been given special consideration in fire and building codes
- Battery rooms are not considered Hazardous Occupancies when the following are provided:
  - Separation from other occupancies
  - Fire detection
  - Spill control & neutralization
  - Ventilation
  - Signage
  - Seismic protection
  - Safety venting
  - Thermal runaway control for VRLA types
- Only two noteworthy telecom battery fires in past 50 years

Lead-Acid vs Lithium-Ion battery (Safety)

Lead-Acid

- Electrolyte, though acidic, is 70% water and non-flammable and low water reactivity
- Rare spills are easy to absorb and neutralize
- Plastic battery case can be specified as highly fire resistant (UL 94 V0 rated)
- The few telecom battery fires have been related to installation mistakes

Lithium-Ion

- Electrolyte can be highly flammable
- Electronic controllers – potentially prone to failure – are needed
- Latent defects in battery manufacture can manifest themselves in catastrophic failures and severe fires
- Fires are difficult to suppress

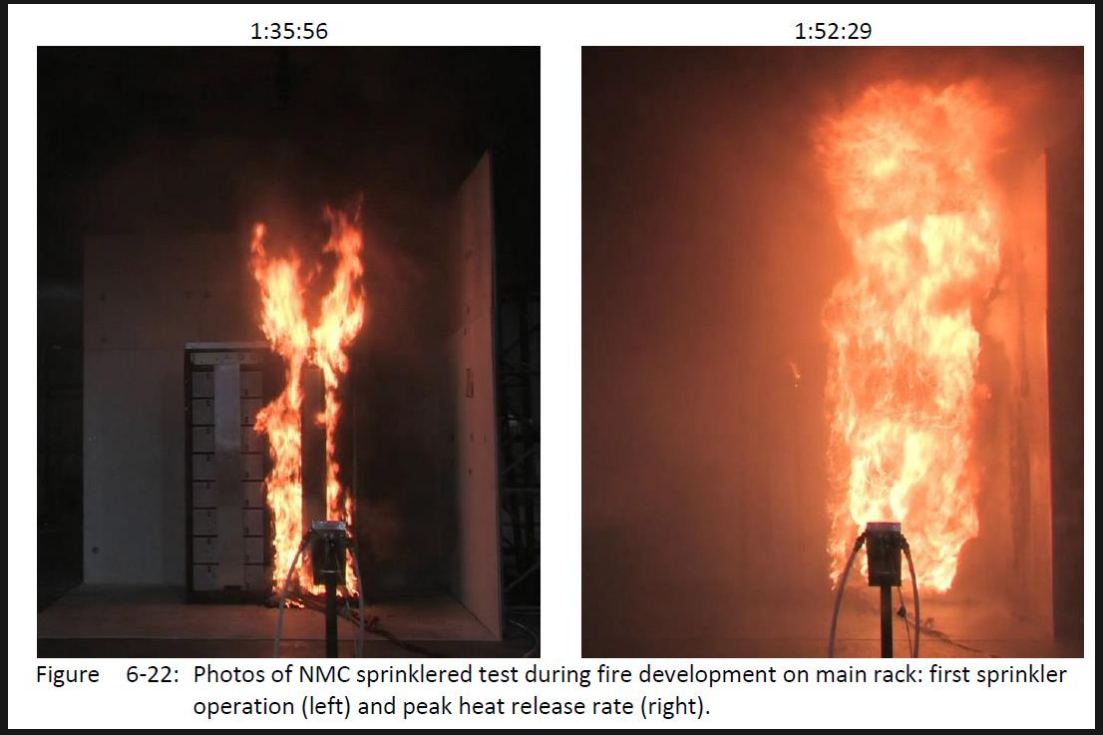


Figure 6-22: Photos of NMC sprinklered test during fire development on main rack: first sprinkler operation (left) and peak heat release rate (right).

Fire Test of NMC Lithium-Ion Energy Storage Systems by FM Global

Video available: https://www.youtube.com/watch?v=HLLXu-2IUpQ

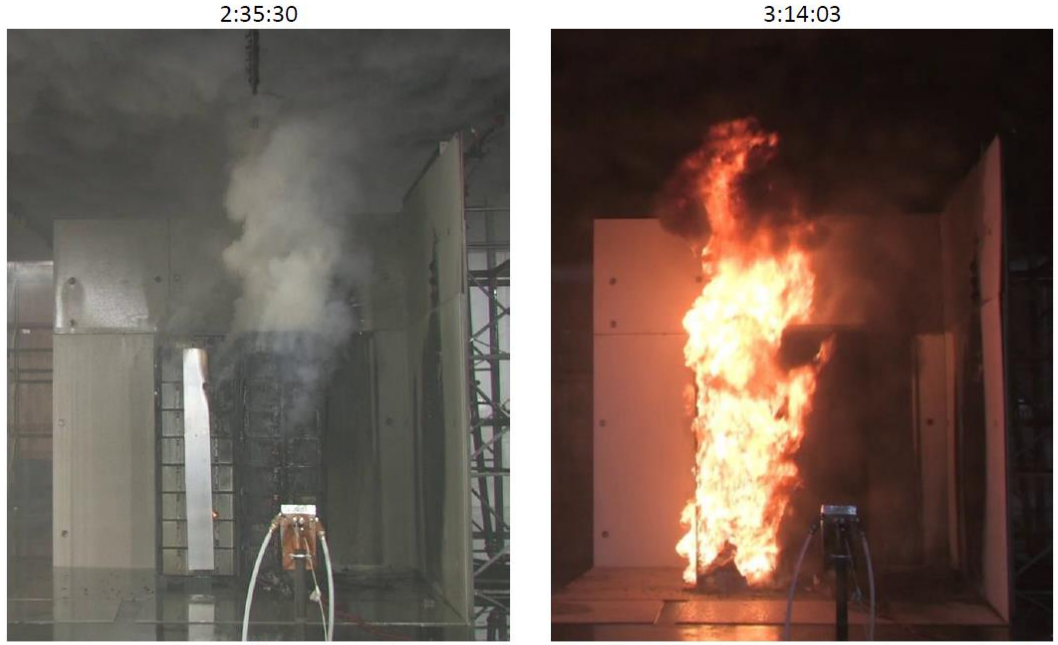


Figure 6-23: Photos of NMC sprinklered test during fire development on target rack: view of rack once sprinklers were shut off (left) and fire size when sprinklers were turned back on (right).

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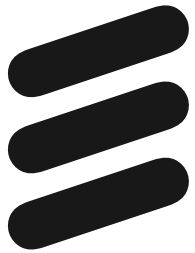
Path Forward

- Recent code and standard updates have focused on fire hazards of lithium-ion batteries for ESS
- Important not to hinder the traditional safer chemistries and applications
- Codes need to differentiate safety requirements based on the real hazard level
- Differentiation of applications as standby power versus Energy Storage Systems would be helpful
- One size does not fit all.



Who or What is ATIS?

- The Alliance for Telecommunications Industry Solutions is an organization that develops standards and solutions for the ICT (Information and Communications Technology) industry. ICT combines telecommunications and IT to deliver and store content.
- Major Carrier Members: AT&T, Bell Canada, CenturyLink, Comcast, Cox, Dish, Sprint, T-Mobile, Verizon…
- Major Supplier Members: Apple, Cisco, Ericsson, Fujitsu, Google, HP, Juniper, Nokia…
- A total of about 130 other member companies
- ATIS Standards and guidelines address 5G, cybersecurity, network reliability, interoperability, sustainability, emergency services and more…