Battery Chemistry and UPS Topology Considerations for Network Edge and MDF Environments

September 13, 2022

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Overview

- Tripplite by Eaton
- Typical UPS in MDF and IDF environments
- UPS Topology Considerations
- Battery type Considerations
- Fulfilling needs, looking to the future

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Tripplite by Eaton

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TRIPP·LITE by EATON

UPS IDF Environments

- On the “Edge”
- Fewer devices
- Mounted “Plug and Play” UPS
- Less Protection?
- Less Runtime?
- Large distributed environments

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UPS MDF Environments

- Central or Edge
- More devices, higher power need
- Rackmount, Tower, Centralized?
- Robust protection
- More runtime
- Critical to operations

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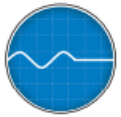
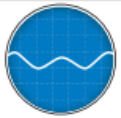
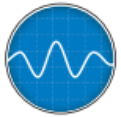
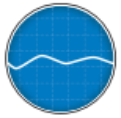
Topological Considerations

- Line Interactive

Power Problem		Definition
1 Power failure		When a superhero loses his ability to fly or **a total loss of utility power.**
2 Power sag		Post-lunch sleepiness or **short-term low voltage.**
3 Power surge (spike)		Rush of energy following a double shot of espresso or **short-term high voltage more than 110 percent of normal.**
4 Under-voltage (brownout)		When your amp's too wimpy to handle the bass line or **reduced line voltage for an extended period of a few minutes to a few days. Often happens during the summer months when everyone is cranking up their air conditioners.**
5 Over-voltage		Inhuman cheerfulness exuded by aerobics instructors or **increased line voltage for an extended period of a few minutes to a few days.**

Topological Considerations

- Line Interactive Continued
  - Protection from power outages
  - Correct minor power fluctuations
  - Utility power is relatively “clean”
  - Less expensive equipment
  - Less sensitive equipment

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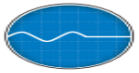
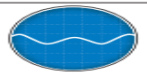
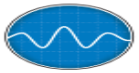
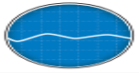
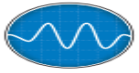
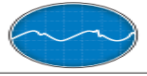
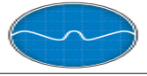
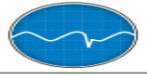
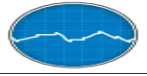
Topological Considerations

- Online Double Conversion

	Power Problem		Definition
1	Power failure		When a superhero loses his ability to fly or **a total loss of utility power.**
2	Power sag		Post-lunch sleepiness or **short-term low voltage.**
3	Power surge (spike)		Rush of energy following a double shot of espresso or **short-term high voltage more than 110 percent of normal.**
4	Under-voltage (brownout)		When your amp's too wimpy to handle the bass line or **reduced line voltage for an extended period of a few minutes to a few days. Often happens during the summer months when everyone is cranking up their air conditioners.**
5	Over-voltage		Inhuman cheerfulness exuded by aerobics instructors or **increased line voltage for an extended period of a few minutes to a few days.**
6	Electrical line noise		Excuse you use to get off the phone quickly or **a high power frequency power wave caused by radio frequency interference (RFI) or electromagnetic interference (EMI).**
7	Frequency variation		Fluctuation in how often you do laundry from week to week or **a loss of stability in the power supply's normal frequency of 50 or 60 Hz.**
8	Switching transient		Breaking up with your significant other only to get back together every six months or **instantaneous under-voltage in the range of nanoseconds.**
9	Harmonic distortion		"Music" blaring from your nephew's headphones or **the distortion of the normal power wave, generally transmitted by unequal loads.**

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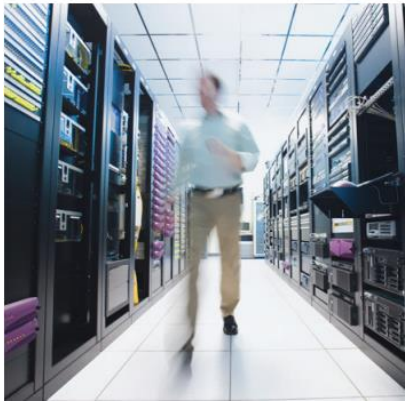
Topological Considerations

- Online Double Conversion Continued
  - Pure clean power to equipment
  - Zero transfer time to battery
  - Known dirty utility power
  - Mission Critical equipment
  - Sensitive equipment
  - Expensive equipment
  - Manufacturing or machinery within same building



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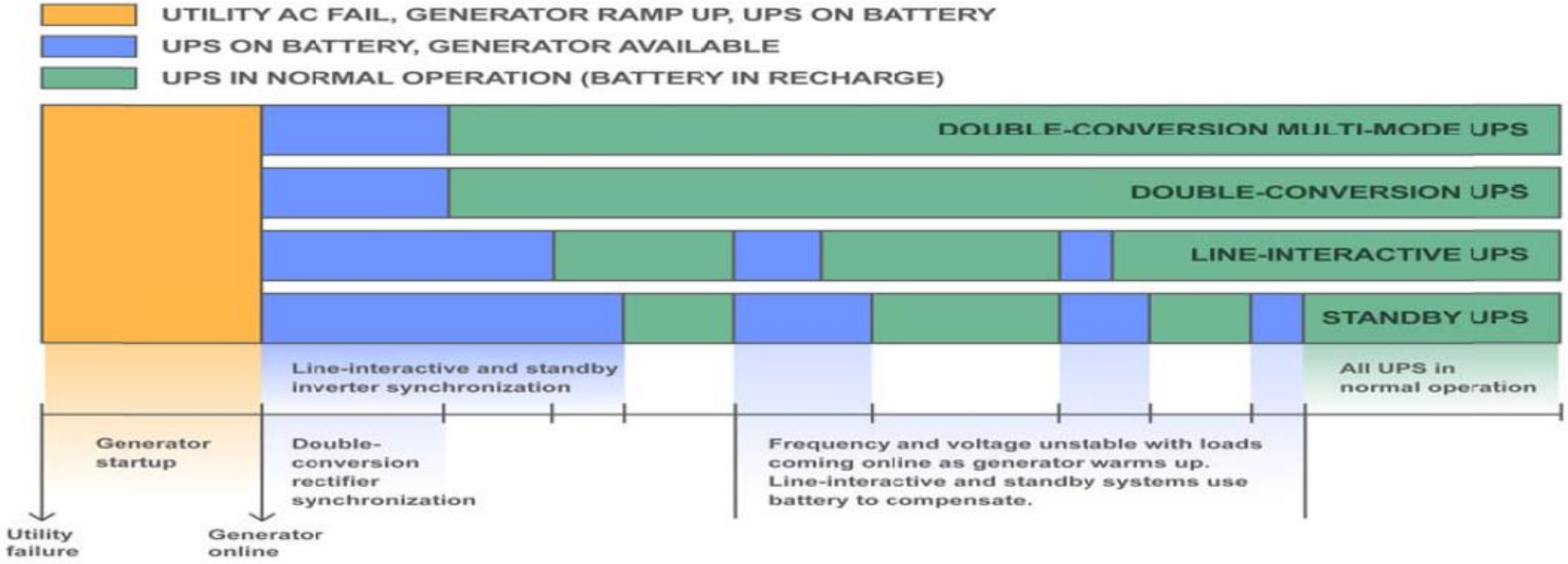
What if I have a generator?

GREAT! You need double conversion!!!



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Battery Chemistry Considerations

- VRLA – Valve Regulated Lead Acid
  - Traditional, reliably used for decades
  - Available in all UPS sizes
  - Low Up-Front cost
  - Recyclable
- Lithium Ion
  - Latest and Greatest
  - Environmentally Friendly*
  - Numerous Benefits

Battery Chemistry Considerations

Safety benefits

- Lithium phosphate battery chemistry is stable and safe
- Battery management system (BMS) actively monitors temperature and charge cycles
- Common vendor for battery and BMS improves integration and safety

Installation benefits

- Save money on battery replacement costs
- 40% weight reduction eases installation
- Shift your refresh cycle to be in line with your IT equipment

Performance benefits

- 2-3X longer life allows you to set it and forget it
- 6X faster charge improves recovery
- BMS provides up-to-date insight into battery performance

Eaton 5P UPS with lithium-ion battery

By the numbers: 5P 1U 1500 VA UPS

Characteristic	VRLA battery	Lithium-ion battery	Lithium-ion benefit
Battery life span	3-4 years	8 years	2-3X longer life
Recharge time (from 0% to 90% runtime capacity	24 hours	4 hours	6X faster recovery
Battery weight	19 lb.	11 lb.	40% lighter weight
Battery replacement cost	$600*	$0	$0 OpEx expenditure
Warranty	3 years	5 years	2X warranty coverage

**Battery and labor cost for two replacements*

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Battery Chemistry Considerations

9PX Li-Ion vs VRLA battery

Characteristic	VRLA	Lithium-Ion	Lithium-Ion benfit
Average battery lifespan	**3-4 years**	**8-10 years**	**2-3x longer life**
Weight	**20% lighter UPS, >40% lighter EBM**		**Easier installation/ Save time**
EBM Footprint	**2U**	**1U**	**Increased U space for critical equipment**
Warranty	**2 years**	**5 years**	**2.5x warranty coverage**
Increased runtime(UPS only)	**80-120% more runtime @ full load**		**Decreased cost per runtime minute**
Battery replacement cost	**$650***	**$0**	$0 OpEx expenditure/ Reduced TCO
*Battery and labor cost for one replacment			

Eaton-owned BMS:

- **Competitive**
  Eaton is not dependent on a single battery supplier or solution. As lithium-ion technology continues to mature, we own our response to design
  Safe
  Eaton can choose the right chemistry, the right safety margins and controls for UPS applications

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SET IT and FORGET IT

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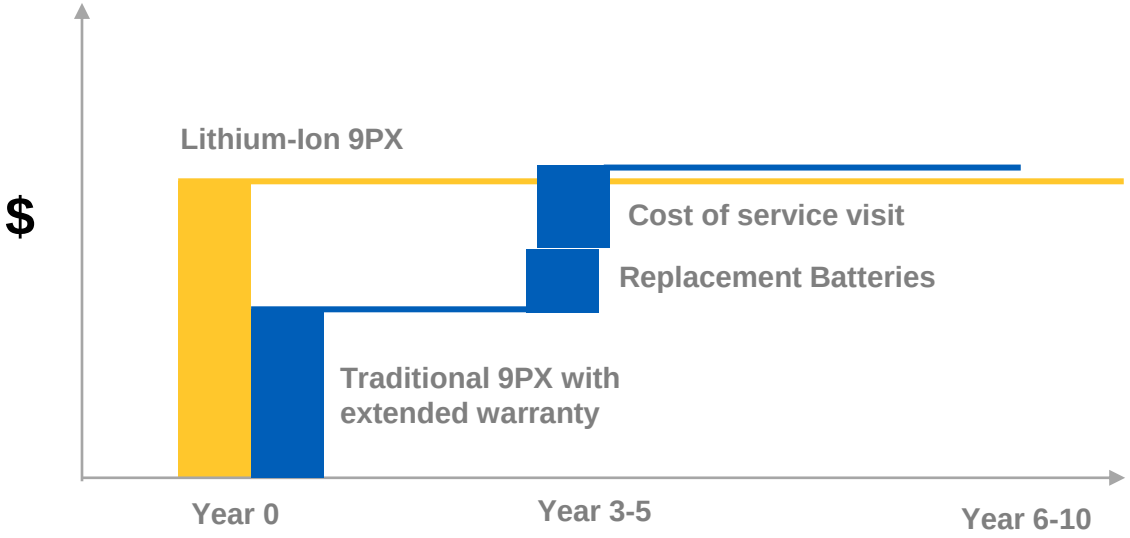
TCO(Total Cost of Ownership)

Is it worth it?



Where to expect financial parity

- **Difficult to service**
  - Remote locations
  - Large deployments
  - Cost of intervention
- **Critical equipment**
  - Core IT
  - Medical
  - Campuses
- **Frequent outage**
  - Need faster recharge
  - More cycles

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Fulfilling needs, Filling the gaps

- IDF
  - Eaton 5P1500R – 1U
  - Tripplite by Eaton 1kVA-3kVA Line Interactive

- MDF – IDF with generator
  - Eaton 9PX Lithium 1.5kVA-3kVA
  - Up to 4 Extended Battery Modules
  - 6kVA Coming soon!
  - Bridge 6kVA-20kVA

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