Challenges &Solution 5G Network Battery Strategy Deployment

Robert Kaptein | Rotterdam | 12/4/2021

Agenda

Legacy Network

5G Requirements

5G Ready Power Solution

Legacy Network Since 2012

%	Size	Radio Set-up	Indoor or Outdoor	Battery Back-up
70%	Large	RRU	Outdoor	100Ah lead acid
3%		RFU	Indoor	100Ah lead acid
25%		RFU	Outdoor	100Ah lead acid
5%	Medium	RFU or RRU	In & Outdoor	100Ah lead acid
2%	Small	RRU	In & Outdoor	Not available

Battery Theft

- Battery theft nationwide all operators
- SDNA Solution for all new and replaced batteries to proof batteries are owned by TMNL

Governmental Regulations

- 5G networks could potentially be indicated to officially become vital infrastructure like power, water, gas
- Potential battery back-up regulation in the future in respect to emergency situations and accessibility of the alarm numbers

Agenda

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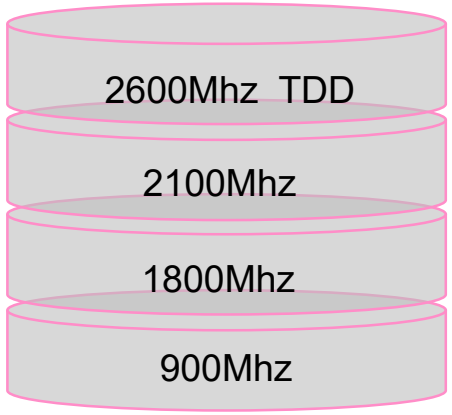
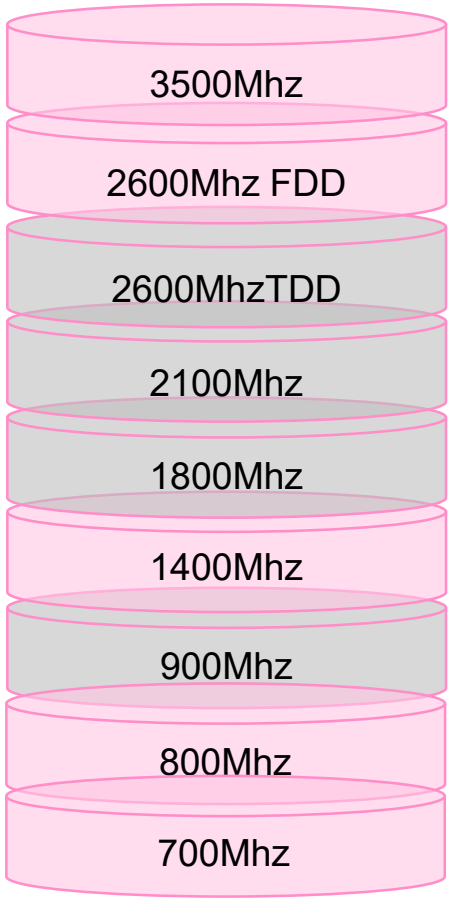
5G RAN Evolution

3-4 KW



11-13 kW



5G RAN Infrastructure Requirements

AC

- ✓ Power consumption
- ✓ Capacity Grid Connection
- ✓ Capacity Landlord Connection

Cabinet

- ✓ Battery Space
- ✓ Cabinet Access / Key plan
- ✓ Cable entry
- ✓ Cooling Capacity
- ✓ Cooling System
- ✓ 19” Space

Power

- ✓ Rectifier Capacity
- ✓ Battery back-up /strategy
- ✓ MCB Capacity
- ✓ LLVD & BLVD Capacity

Infrastructure

- ✓ DC cable diameter

Agenda

Legacy Network

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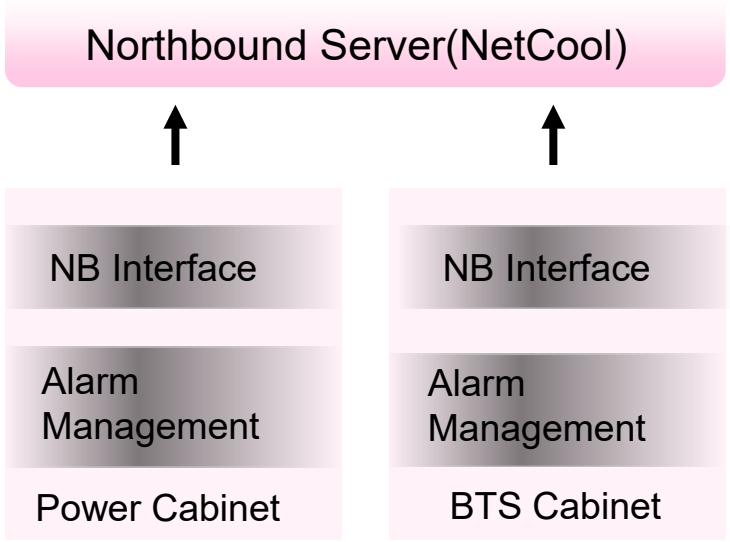
Standardizing OSS/Settings

Managing 100% Network wide:

- AC Failure *(battery discharge)*
- MCB's (LLVD # 1, 2 & 3) & BLVD
- Batteries

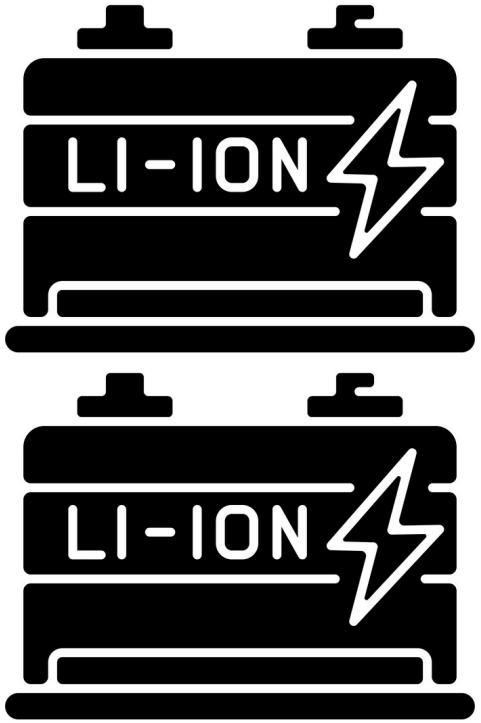


Standardizing Settings/Hardware

- ✓ Reuse existing cabinets
- ✓ Reuse existing power system
- ✓ Add smart DC distribution panels + # LLVD extension
- ✓ Replace to Lithium battery for the backup capacity extension
- ✓ Add standardized controllers/Interface into cabinet
- ✓ Standardizing setting & DC connections for all scenario’s

Battery Back-Up vs.

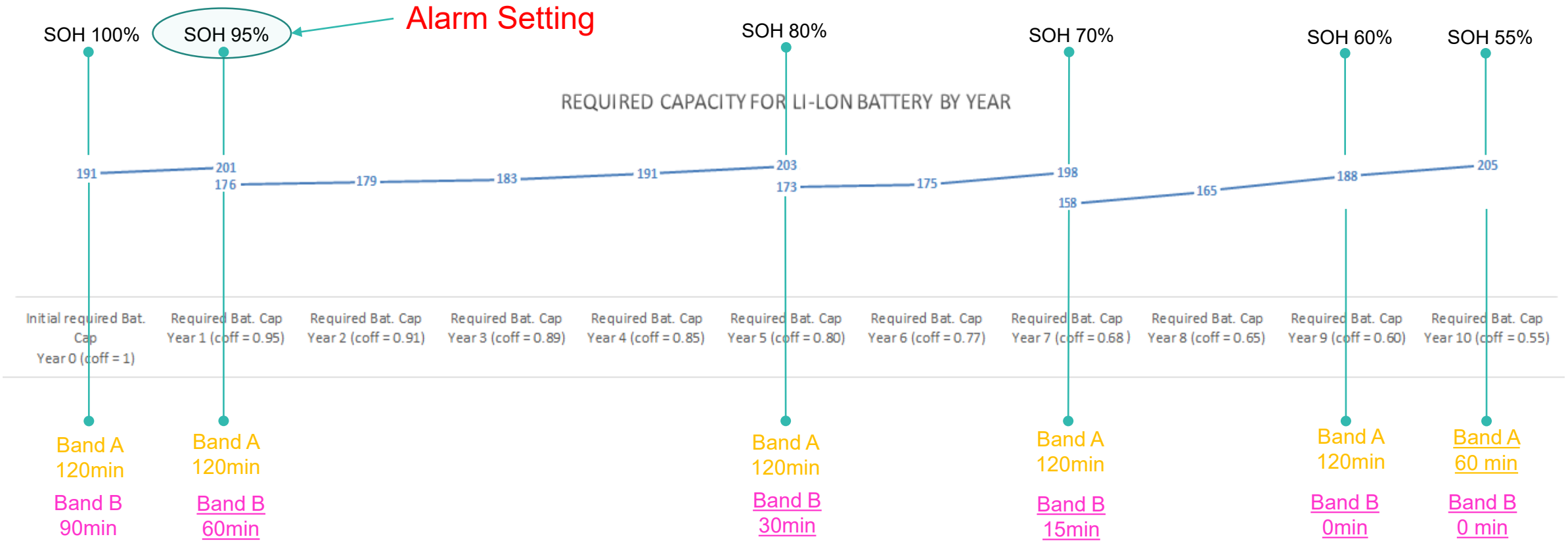
- New 2x100Ah lithium ion (high density) batteries will be installed in the same position as the current 1x100Ah which supports:
- Higher power consumption max 9600W
- Peak Load *(Max 2min)* of 13000W which support future high-capacity requirements
- Anti theft features
- More discharge cycles
- No maintenance anymore
- Full remote management via OSS with SOH, SOC, remaining battery back-up supporting



Standardizing Flexible Remote Batter Strategy

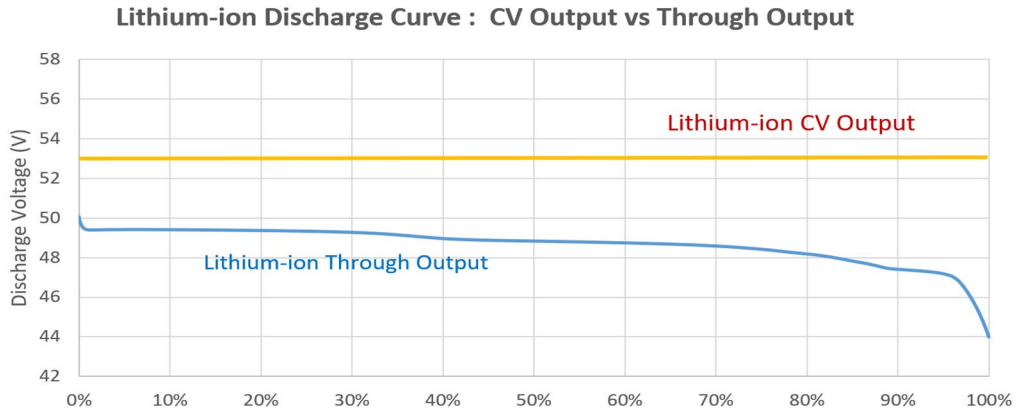
Description	Battery Back-up Requirement / min		LLVD or BLVD
Band A	120		LLVD 1
Band B	SOH = 100%	90	LLVD 2
	SOH = 95%	60	
	SOH = 80%	30	
	SOH = 70%	15	
	SOH = 60%	0	
Band C	4		LLVD 3
Band D	4		LLVD 3/4
Transmission	120		BLVD
BBU	120		BLVD

Standardizing Flexible Remote Batter Strategy



Battery Back-up vs. Infrastructure

- The battery continuous output is 53.5 or 57V
- Fully utilizing the existing power cables & breakers vs. the new more consuming WB RRU's
- *2x100Ah lithium-ion batteries within the same space as 1x100Ah lead acid.*



	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130
1200	48	48	48	48	57	57	57	57	57	57	57	57	57	57	57	57	57	72	72	72	72	72	72
1100	48	48	48	48	48	57	57	57	57	57	57	57	57	57	57	57	57	57	57	72	72	72	72
1000	48	48	48	48	48	48	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	72	72
900	48	48	48	48	48	48	48	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57
800	48	48	48	48	48	48	48	48	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57
700	48	48	48	48	48	48	48	48	48	48	57	57	57	57	57	57	57	57	57	57	57	57	57
600	48	48	48	48	48	48	48	48	48	48	48	48	57	57	57	57	57	57	57	57	57	57	57
500	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	57	57	57	57	57	57	57
400	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	57	57	57
300	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
200	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
100	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48

Cable Length (m)

End