

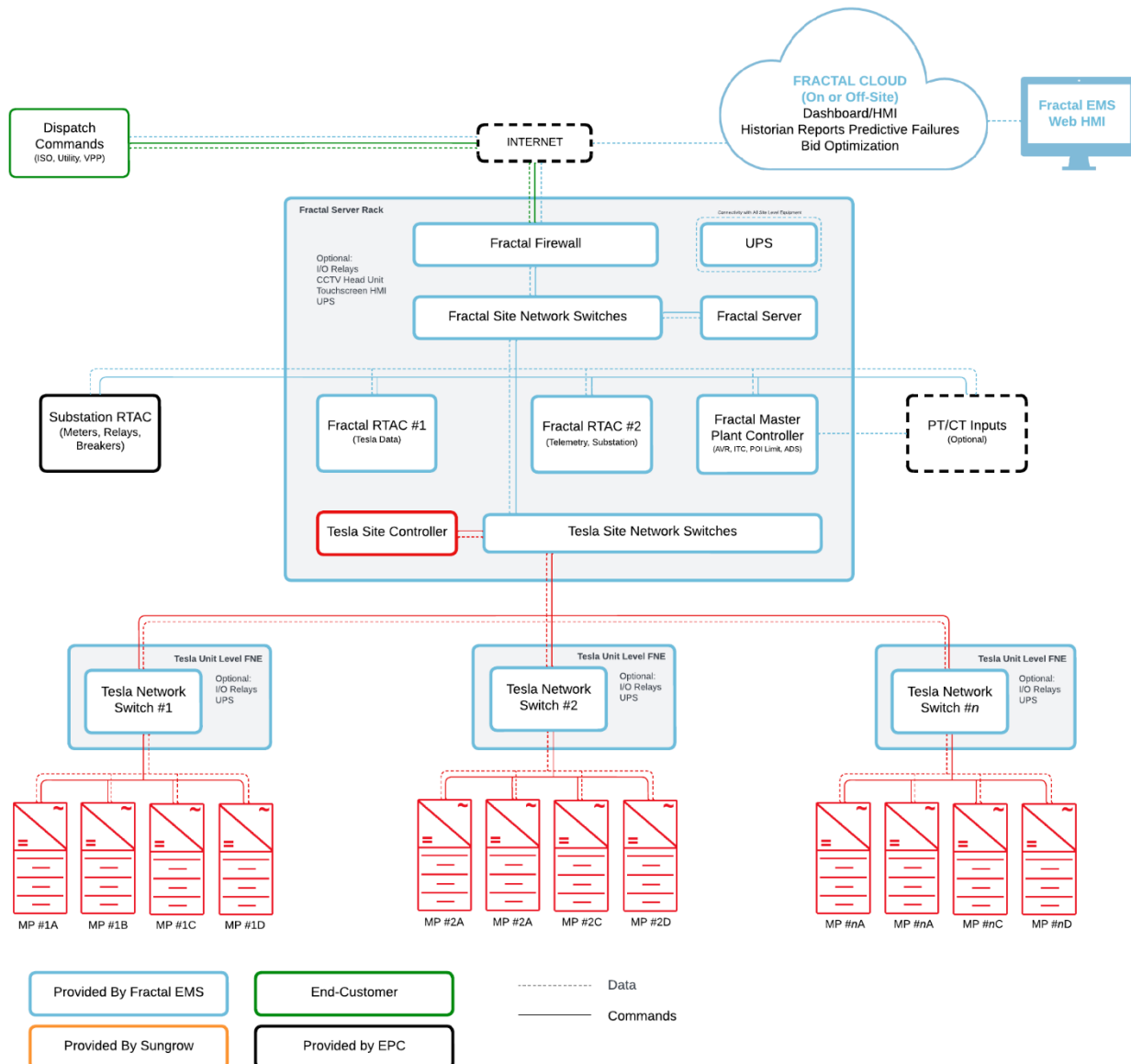
FRACTAL EMS CONFIGURATION WITH TESLA MEGAPACK 2XL

Fractal EMS works with Tesla to provide the missing components to create a turnkey solution.

- Tesla provides: Megapacks and Tesla Site Controller
- Fractal EMS provides: POI controls (using an MPC), networking, RTAC programming, HMI and Historian, and cybersecurity

This option removes Fractal's Site Controller and Unit Controller because Tesla provides a Site Controller and Megapack controller. Fractal issues a site level power command from the Fractal MPC to Tesla's Site Controller. The Tesla Site Controller decides how to distribute power between the Megapacks. Fractal and Tesla work together to commission the project. The Tesla data points are captured by Fractal's Historian. Otherwise, Fractal EMS provides the remainder of our normal scope.

ARCHITECTURE



TESLA MEGAPACK 2XL

The Tesla Megapack 2 (Megapack) is an all-in-one utility-scale energy storage system optimized for cost and performance. It scales to the space, power, and energy requirements of any site from 1 MWh to 1 GWh+. The product includes a custom enclosure, batteries, bi-directional inverter, and thermal management system. At the site level, the Tesla Site Controller uses intelligent software to control and monitor Megapacks across the entire energy storage site. Megapack's architecture consists of battery cells aggregated into modules, and power electronics modules. Both are thermally managed by an integrated liquid cooling and heating system for thermal safety, enhanced performance, and reliability. The architecture also includes sensors supporting embedded monitoring and controls as well as electrical interface equipment including an industry standard breaker for AC protection. Learn more about the Tesla Megapack 2 at <https://www.tesla.com/megapack>.



Specifications:

- Interconnection: 480V AC 3 phase
- Dimensions: W 347 in, D 65 in, H 110 in
- Weight: 84,000 lbs max
- Ratings and Certifications: IP66, UL 1973 / 9540 / 9540A / 1741, IEC 62619
- Nominal AC Voltage 480 V AC 3-phase
- Nominal Frequency 50 or 60 Hz
- Thermal Management: Liquid Cooled

2 Hour Duration:

- Power & Energy: 1,927 kW / 3,854 kWh per Megapack
- Round Trip Efficiency: 92.0%

3 Hour Duration:

- Power & Energy: 1,281 kW / 3,847 kWh per Megapack
- Round Trip Efficiency: 92.5%

4 Hour Duration:

- Power & Energy: 979 kW / 3,916 kWh per Megapack
- Round Trip Efficiency: 93.7%

DIVISION OF RESPONSIBILITY

The division of responsibility below delineates the scope of work between Fractal EMS and Tesla.

Description	Fractal EMS Standard Offering	Optional	Tesla	EPC / 3rd Party / Customer
Design				
HMI - Local	X			
HMI - Cloud	X			
HMI - Local Terminal		X		
Local Historian	X			
Web Historian	X			
Main Network Switch	X			
Firewall /VPN	X			
ISP				X
Main Plant Controller (MPC)	X			
Tesla Main Network Switch(es)	X			
Tesla Field Network Enclosure (FNE)	X			
Tesla FNE Network Switches	X			
Tesla Site Controller			X	
Site Server Rack	X			
Housing for Server Rack / Site Equipment		X		X
RTAC for Megapacks / field data	X			
FNE Power Supply	X			
MPC Power Supply	X			
MPC UPS	X			
Tesla Site Controller Power Supply			X	
Tesla Site Controller UPS			X	
FNE UPS		X		X
60% - Drawing Set (EMS and Comms)	X			
90% - Drawing Set (EMS and Comms)	X			
IFC - Drawing Set (EMS and Comms)	X			
Control Narrative	X			
IP Schema	X			
Points List - Consolidated	X			
Points List - Individual Components			X	X
Communication Flow / Network Comms Diagram	X			
Provide EMS/PPC PSSE and PSCAD Models	X		X	
PSSE / PSCAD Study				X
Utility / ISO Interface using RTAC	X			X
Balance of Plant - Design				X
Balance of Plant - Breaker Control				X
Balance of Plant - Transformer / POI Overload Protection				X
Balance of Plant - Metering				X
Balance of Plant - Capacitor Banks				X
Non-Storage Generation design				X
Site patch panel		X		X
FNE patch panels		X		X
Procurement				
Main Plant Controller (MPC)	X			
Fractal Server	X			
FNE Network Switches	X			
Site Network Switches	X			
Tesla Site Controller UPS		X	X	
Main Plant Controller (MPC)	X			
FNE Power Supply	X			
MPC Power Supply	X			
Tesla Site Controller Power Supply		X	X	
FNE	X			
FNE Patch Panel	X			
RTAC for Megapacks / field data	X			
SFP modules	X			
Site Patch Panels		X		X
Fiber cabling to Fractal Site controller / server rack				X
Fiber cabling to Unit Controller Network Switches				X
Fiber / Ethernet cabling within Fractal Server Rack	X			
Firewall and VPN	X			
ISP				X

Description	Fractal EMS Standard Offering	Optional	Tesla	EPC / 3rd Party / Customer
Installation				
Fractal equipment	X			
Tesla Site Controller Assemblies (server rack / site equipment) / Connections within Rack		X	X	
Firewall	X			
Power cabling to Tesla Site Controller / server rack		X	X	
Power cabling to MPC / server rack				X
Network cabling to Fractal server rack				X
Fiber cabling to Fractal Site Controller / server rack				X
Fiber cabling to Fractal Unit Controllers				X
Site Controller / server rack patch panel				X
FNE patch panel				X
Commissioning				
FAT - Factory Acceptance Testing of Fractal-Provided Equipment	X			
FIT - Factory Integration Testing of BESS		X		X
Software Integration, commissioning and Substantial Completion	X			
Backfeed power to equipment				X
Monitoring				
24/7 Remote Monitoring and Restoration		X		
Troubleshooting and Technical Support		X		
Cyber Security				
MFA authentication and account management	X			
Layering and segmentation of devices and encryption including endpoints, firewalls, and intrusion detection systems	X			
Real-time monitoring of appliances, OS, configuration, firmware, common vulnerabilities and exposures	X			
Operation, engineer, commissioning malware, anti-virus, ransomware, spyware, and malicious code protection and mitigation	X			
Data retention and recovery training and testing	X			
Penetration and vulnerability testing	X			
Inventory control of network hardware and software assets	X			

CONTACT US

Fractal EMS combines advanced features, competitive pricing and unmatched experience to create the industry's best value in energy storage and hybrid controls. Schedule a demo to learn more about the Fractal EMS platform or plan a visit to tour our facility in Austin, TX.



FRACTAL EMS

- INTEGRATION
- CONTROLS
- NETWORKING
- SCADA/RTAC
- CYBERSECURITY
- HMI / HISTORIAN



AMERICAN BMS

THREE LEVEL BMS
AND CYBERSERSECURITY



DISPATCH OPTIMIZATION

FORECASTING AND
OFFER CURVES



FRACTAL MODEL

INVESTMENT-GRADE
DESIGN & ANALYSIS



MONITORING SERVICES

NERC CIP COMPLIANT
24/7 OPS CENTER