

1.1 REQUIREMENTS & CONSTRAINTS

List all requirements for your project. Separate your requirements by type, which may include functional requirements (specification), resource requirements, physical requirements, aesthetic requirements, user experiential requirements, economic/market requirements, environmental requirements, UI requirements, and any others relevant to your project. When a requirement is also a quantitative constraint, either separate it into a list of constraints, or annotate at the end of the requirement as “**(constraint)**.” Ensure your requirements are realistic, specific, reflective or in support of user needs, and comprehensive.

Functional - What a product should do

- Facilitate communication between two or more Microgrid pallets through TCP/IP
- Send configuration commands to onboard OutBack Inverter and system
- Arbitrate master/slave designation between pallets automatically
- Provide a display to view system status and major settings

Resource - What external resources a system may use

- Accept communication information following SunSpec Modbus from a connected grid
 - Possibly use this information to advise configuration settings
- Microcontroller to facilitate above communication
- Communication from other grids/controllers

Physical - Product size, weight, shape, etc.

- Controller should fit on top of the pallet and connect to the existing RJ45 ports and OutBack AXS converter
- The display should fit alongside or replace MATE3 controller/display

Aesthetic - How the product should look

- The interface should be simple with little to no interaction needed by the end user

User experiential

- Users can attach Microgrid pallets together without additional configuration.

Constraints - limiting thresholds

- Fixed hardware for the existing system(s)
- Proprietary communication protocols with some existing systems (may be a non-issue)

1.2 ENGINEERING STANDARDS

What Engineering standards are likely to apply to your project? Some standards might be built into your requirements (Use 802.11 ac wifi standard) and many others might fall out of design. For each standard listed, also provide a brief justification.

Tactical Microgrid Standard (TMS) - Draft

Justification - Some of the primary applications of these units are in disaster relief and military applications. TMS is meant to be the standard for Department of Defense (DoD) and industry needs/applications. TMS is meant to provide simple setup, be efficient, with resilient generation and distribution, all while being an open architecture.

SunSpec Modbus

Justification - Open communication standard that standardizes parameters and settings for monitoring and controlling distributed energy resources (DER). This protocol enables communication amongst different devices from multiple vendors within the same device/grid. Sunspec is made up of various IEEE protocols standardizing signal-to-noise ratios, and other aspects of network communications.

TCP/IP communication

Justification - To communicate with the pallets (which use a proprietary communication protocol) we send TCP/IP packets containing data which conforms to the SunSpec standard. An OutBack hardware device converts from their proprietary communication to TCP/IP, so to implement high level functions like master/slave arbitration we will need to communicate with this standard.