# SPMD Usecases - Buildings

Bruce Nordman, LBNL
bnordman@lbl.gov
December 1, 2019

# Usecase: Buildings Use Cases

Buildings (commercial and residential; industrial non-process) could host many, diverse, applications of MultiDrop SPE. Almost all would use new wiring. Three cases with slides. Others are: sensors (smoke, CO, CO2, occupancy, …), ventilation fans, cameras, audio, HVAC (dampers, baffles). A single SPE cable might have diverse devices on it.

Availability of reliable power often a necessary or appealing feature.

Notes: Cable length values just a guess. Most other values loose.
Generally assume that if a device is removed, can join cables with a simple connector. Always want hot pluggability and plug-and-play configuration. A few devices will only use power; most will communicate.

# Usecase: Lighting

| Item | Min Value | Desired value | Extra information |
|---|---|---|---|
| Supported nodes on one mixing segment | 5 | 10 | |
| Minimum supported cable length | 20 m | 30 m | |
| Acceptable cable gauges | | | likely new wiring, so wire loss is main consideration. |
| Required power for a node | 5 | 20 | |
| Required initial power allocation | 0.5 | 1 | Only what needed to communicate. |
| 60V voltage OK ? | Yes | | |
| Interoperability level for the application | PnP | | |
| Pass through or T connection | either, assuming can join cables with a connector | | |
| Hotpluggability | Yes | | |
| Possible market (in #nodes/year) | millions | | |

Notes: Mostly light sources of a variety of power levels. Could also include lighting controls (e.g. wall units) to power controls and facilitate communication with light sources. Some lights may be reliable emergency lights. Could be only controls (for SPE lights). Could include miscellaneous other ceiling devices, e.g. cameras, sensors, and HVAC controls.

Presentation: <URL>

# Usecase: USB wall outlets

| Item | Min Value | Desired value | Extra information |
|---|---|---|---|
| Supported nodes on one mixing segment | 4 | 10 | |
| Minimum supported cable length | 20 | 30 | |
| Acceptable cable gauges | | | likely new wiring, so wire loss is main consideration. |
| Required power for a node | 5 | 10 | Min. available. Assume can negotiate higher levels. |
| Required initial power allocation | 0.2 | 0.5 | |
| 60V voltage OK ? | Yes | | |
| Interoperability level for the application | PnP | | |
| Pass through or T connection | likely new wiring, so wire loss is main consideration. | | |
| Hotpluggability | Yes | | |
| Possible market (in #nodes/year) | millions | | |

Notes: 5 W minimum per port; some boxes may have multiple ports.  Assume can negotiate any level up to near 100W if available.

Presentation: <URL>

# Usecase: Outdoor loads

| Item | Min Value | Desired value | Extra information |
|---|---|---|---|
| Supported nodes on one mixing segment | 4 | 20 | |
| Minimum supported cable length | 20 | 40 | |
| Acceptable cable gauges | | | likely new wiring, so wire loss is main consideration. |
| Required power for a node | 5 | 10 | |
| Required initial power allocation | 0.5 | 1 | Min. available. Assume can negotiate higher levels. |
| 60V voltage OK ? | Yes | | |
| Interoperability level for the application | PnP | | |
| Pass through or T connection | likely new wiring, so wire loss is main consideration. | | |
| Hotpluggability | Yes | | |
| Possible market (in #nodes/year) | millions | | |

Notes: Loads could include anything outdoor including lighting, lighting control, cameras, audio, USB outlets, small pumps (fountains), sensors (occupancy, temperature, light). Safety, small wire size, and ease of installation a key benefit.

Presentation: <URL>

# Thank You

| Item | Description |
|---|---|
| Supported nodes on one mixing segment | Indicate the numbers of nodes on a single mixing segment. The minimum reflects the number of nodes needed for the usecase to make sense. The desired value represents a natural fit for the application. Both numbers could be the same. |
| Minimum supported cable length | Is the length you need between the two furthest nodes on the mixing segment. |
| Acceptable cable gauges | What cable gauges can be accepted for the application (consider cost, size, bend radius, …) |
| Required power for a node | How much power is needed in the node to run the application. This is the power level as measured at the connector of the device. Note that there may be a rectifier or other elements that cause some loss (2% to 5% typical). |
| 60V voltage OK ? | Is it acceptable for the input voltage to be up to 60V ? If not, what is the reason ? |
| Required initial power allocation | Because this is a bus powered system, a node needs to be permitted to draw some amount of power after being plugged in. This power is used to communicate with the PSE about the power requirements. The system should be able to operate it's PHY with this power. How much power do you foresee to need for this. This is different from the "Required power for a node" which is about the complete power need of the device. |
| Interoperability level for the application | Choose between "plug&play" or "engineered" system.<br>Plug & play means that a compliant device works when connected to a network of other compliant devices. There is no need for configuration or to verify if devices will be compatible or not.<br>Engineered system means that you will use the standard within your own products or that the end user can determine which devices will work in the system. |
| Pass through or T connection | See slide 4-6 of http://grouper.ieee.org/groups/802/3/SPMD/public/sep19/spmd_cjones_01_0919.pdf<br>If the application cannot be equipped with two connectors, select T connection.<br>If it must be possible to live connect a new node without disconnecting other nodes, also select T connection. |
| Hotpluggability | Should it be supported to connect new devices while the bus is powered and guaranteed that this does not cause devices to be interrupted (eg. Reboot, lose long stretches of data). If not required, select no. |
| Possible market size | Potential market expressed in number of nodes. Do not express this in currency of any kind due to IEEE SA rules. |