

Process Automation System Quantities

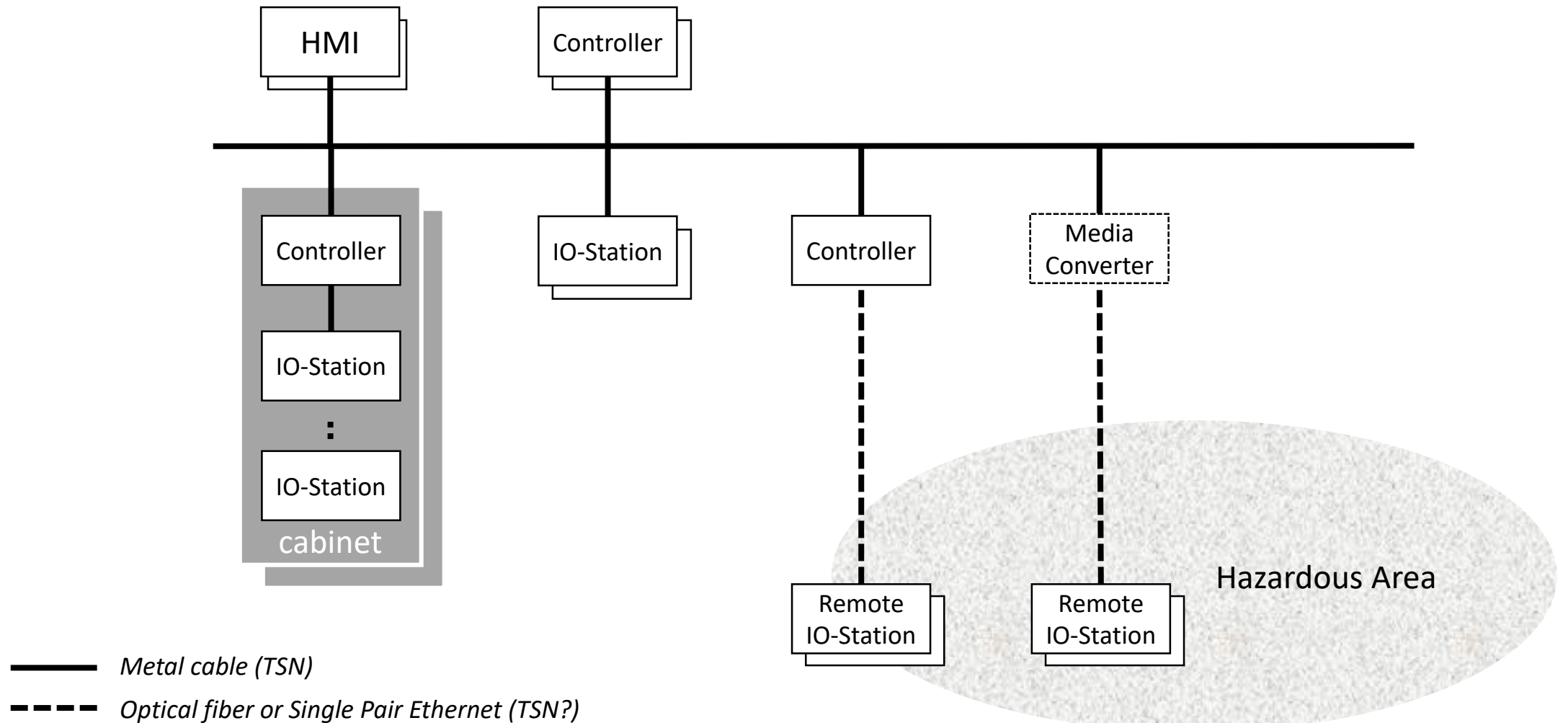
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Process Automation Characteristics

- A PA system is used to control a process such as chemical, steel, oil-refineries, petrochemical, paper or pulp factories.
- PA data consist of many analog values, such as temperature, pressure, flow, or level.
- Typically more standard controls (i.e. PID: Proportional-Integral-Derivative) are used than other industries (e.g. discrete or motion control).
- Fast control cycle is **NOT** required (1 sec cycle is enough in many cases).
- A PA system operates 24x7x365, and requires procedures to stop safely. Hence, the extra high reliability and availability is required.

PA System Architecture Example



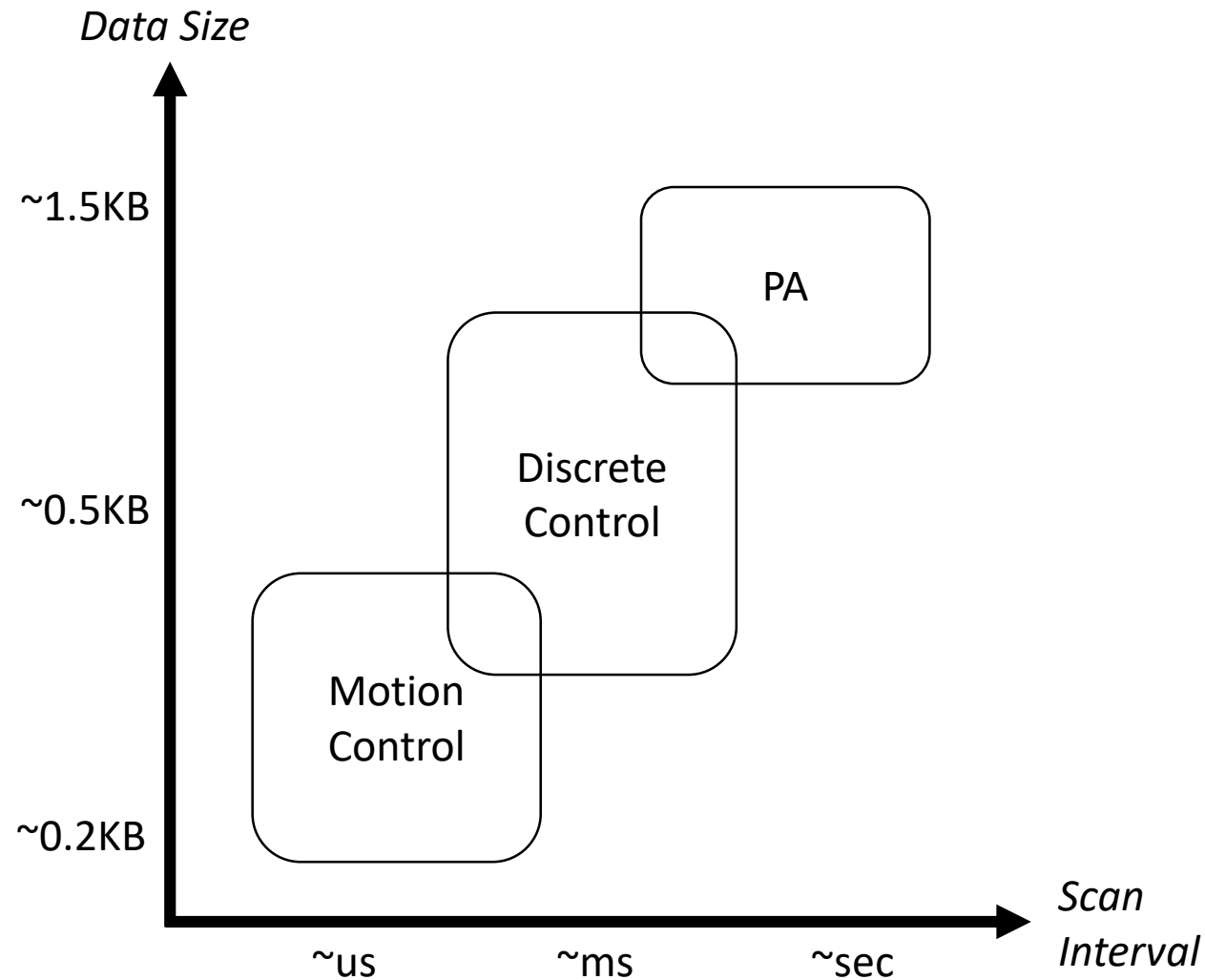
Maximum Quantities Example

- Up to 32,768 redundant TSN end-stations per system
 - **HMI or Controller:** up to 2,048 redundant stations (typically 1 vs. 15)
 - **IO-Station:** up to 30,720 redundant stations
 - Up to 16 IO-Stations per Controller (1,920 controllers)
 - 128 IO items per IO-Station -> about 4M IO items in a system
- Up to 64 TSN domains per system
- Up to 1,024 redundant TSN end-stations per TSN domain
 - 4 HMIs
 - 60 Controllers
 - 960 IO-Stations

Communication Example (in a TSN domain)

- Application Scan Interval
 - HMI: 1,000ms
 - **Controller: Basic 1,000ms, Fast 100ms**
- Controllers to HMI (monitoring)
 - Data size: 1,400 Byte
 - Up to 3,000 subscribed signals per scan interval
 - Scan interval: 1,000ms
- IO Control Data Size (PV or MV)
 - 4 Byte data + 1-4 Byte status per IO item
 - Up to 1,024 Byte per IO-Station (which has up to 128 IO items)
 - Input vs. Output = 2:1 (typically)
- IO-Stations to Controllers (input)
 - Up to 2,000 published signals per scan interval (typical 1,500)
 - Scan interval: **100 - 1,000ms (typical 1,000ms)**
- Controllers to IO-Stations (output)
 - Up to 2,000 published signals per scan interval (typical 750)
 - Scan interval: **100 - 1,000ms (typical 1,000ms)**
- Controllers to Controllers
 - Up to 1,000 published signals per scan interval
 - Scan interval: **50 - 500ms (typical 500ms)**

Short Summary



- PA data size is relatively larger than others.
- PA scan interval is larger than others.
- The number of station in a PA “system” is very large.

Thank you for your attention!