

Mobile/Wireless Technologies & Applications

Appendix 2

- Cellular M2M Market
- M2M standardisation Efforts (OPC Foundation)



Cellular M2M Service Providers

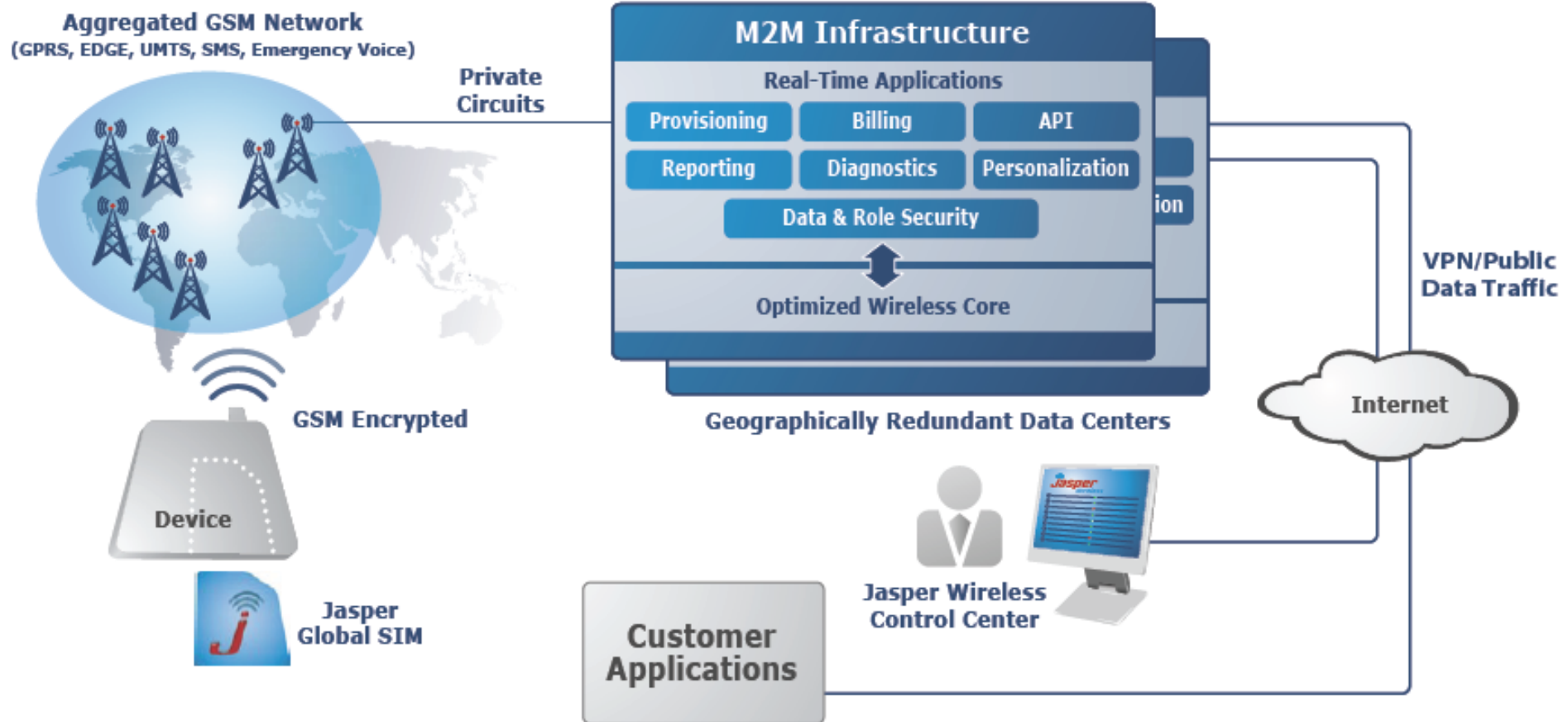
- Traditional mobile network operators (MNOs)
- Mobile virtual network operators (MVNOs) that focus on the M2M market
- M2M mobile operators (MMOs).
 - ★ Jasper (www.jasper.com) and Aeris (www.aeris.net) – Key players

Cellular M2M Service Providers

- Mobile operators are positioning themselves differently in the M2M value chain.
 - ★ Most of them are actively or passively limiting their role to provide network connectivity services.
 - ★ Some such as Orange, Telefónica O2, Telenor and TeliaSonera are participating directly in the market.
 - ★ Some others like Vodafone have adopted an indirect approach with partner resellers.

M2M Infrastructure – An Example

JASPER WIRELESS NETWORK



Models of cellular M2M application provisioning

- In-house development
- Application provider – specialised in some verticals
- Solution provider - provides both the packaged application and network connectivity
- Communication provider that offers a packaged or custom-developed application, along with network connectivity.

Key Service Provider Market Issues

- **Device certification:** While the certification of cellular devices outside of North America is relatively simple, the situation within North America is complex and expensive, primarily as a result of the additional certification requirements of the main North American MNOs. MVNOs and MMOs are attempting to make this process simpler for their customers through easier certification procedures and industry lobbying in such organizations.
- **Provisioning and management:** MNOs are oriented toward cellular handset provisioning and management. MVNOs and MMOs have adapted their systems and processes toward the needs of a large number of remote, low data-rate, data-oriented M2M devices. MMOs have more flexibility in their provisioning and management capabilities compared to the MVNOs, by virtue of controlling their own network elements.
- **Tariffs:** MNOs are oriented toward serving the cellular handset market at ARPU in the \$50 to \$60 per month range. They face a significant challenge in serving the cellular M2M market, where ARPUs per “subscriber” are significantly lower, in the \$5 to \$15 range. MVNOs and MMOs have developed systems and processes to address this economic difference.
- **Coverage and Roaming:** MNOs control the radio infrastructure and network elements for their respective home regions, which can span national and international boundaries. However, given the nature of M2M applications, many customers find themselves having to work with multiple MNOs to provide service on an international scale. MVNOs and MMOs provide a significant benefit by aggregating the networks of multiple MNOs and presenting the customer with one network interface and tariff.

Standardisation - OPC Foundation

➤ OPC- Unified Architecture

★ OPC Unified Architecture (UA) is a platform-independent standard through which various kinds of systems and devices can communicate by sending *Messages* between *Clients* and *Servers* over various types of networks.

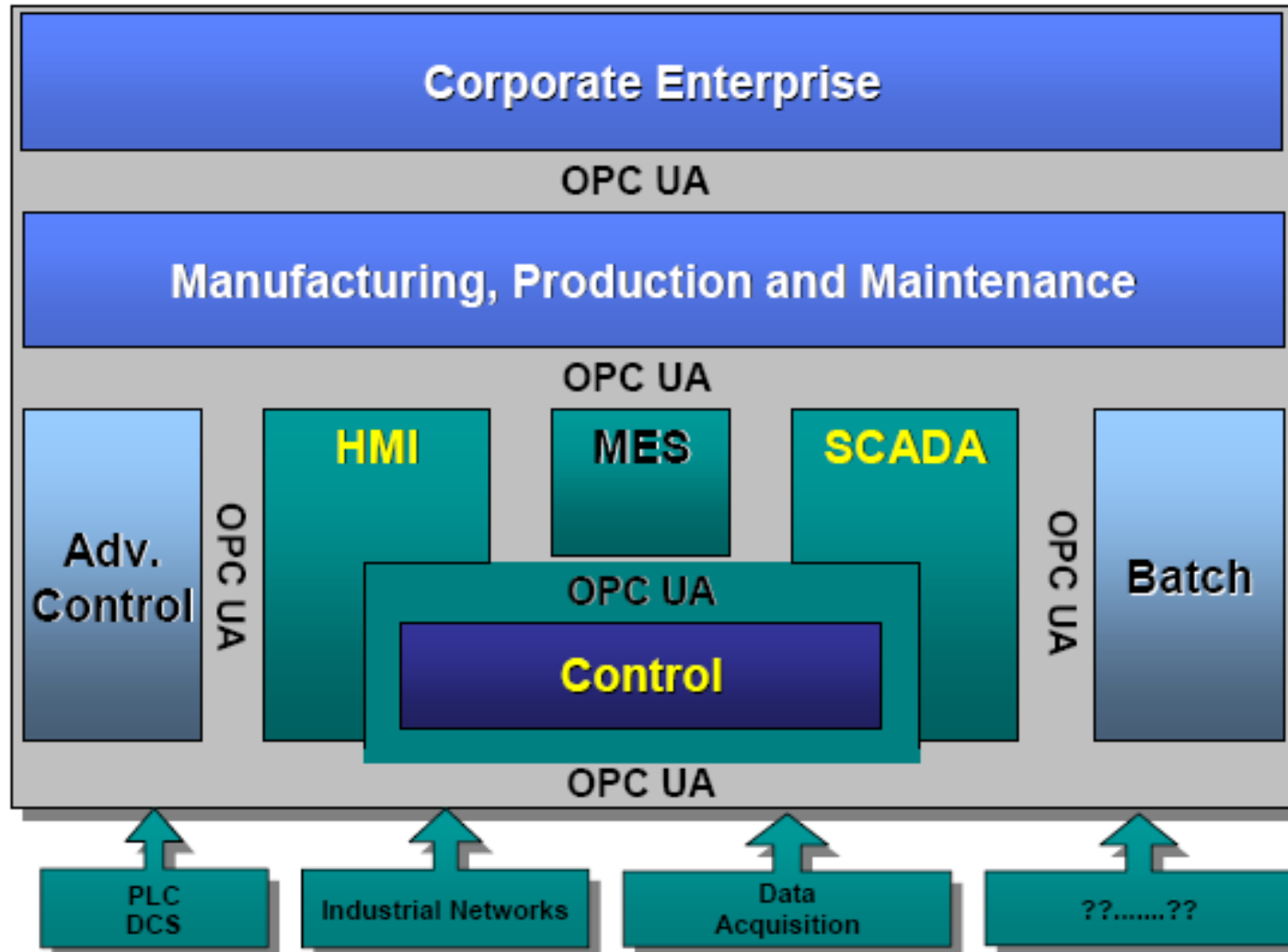
★ Integrated *AddressSpace* and service model

➤ type definitions for the *Objects* accessed from the *AddressSpace*.

➤ data to be exposed in many different formats,

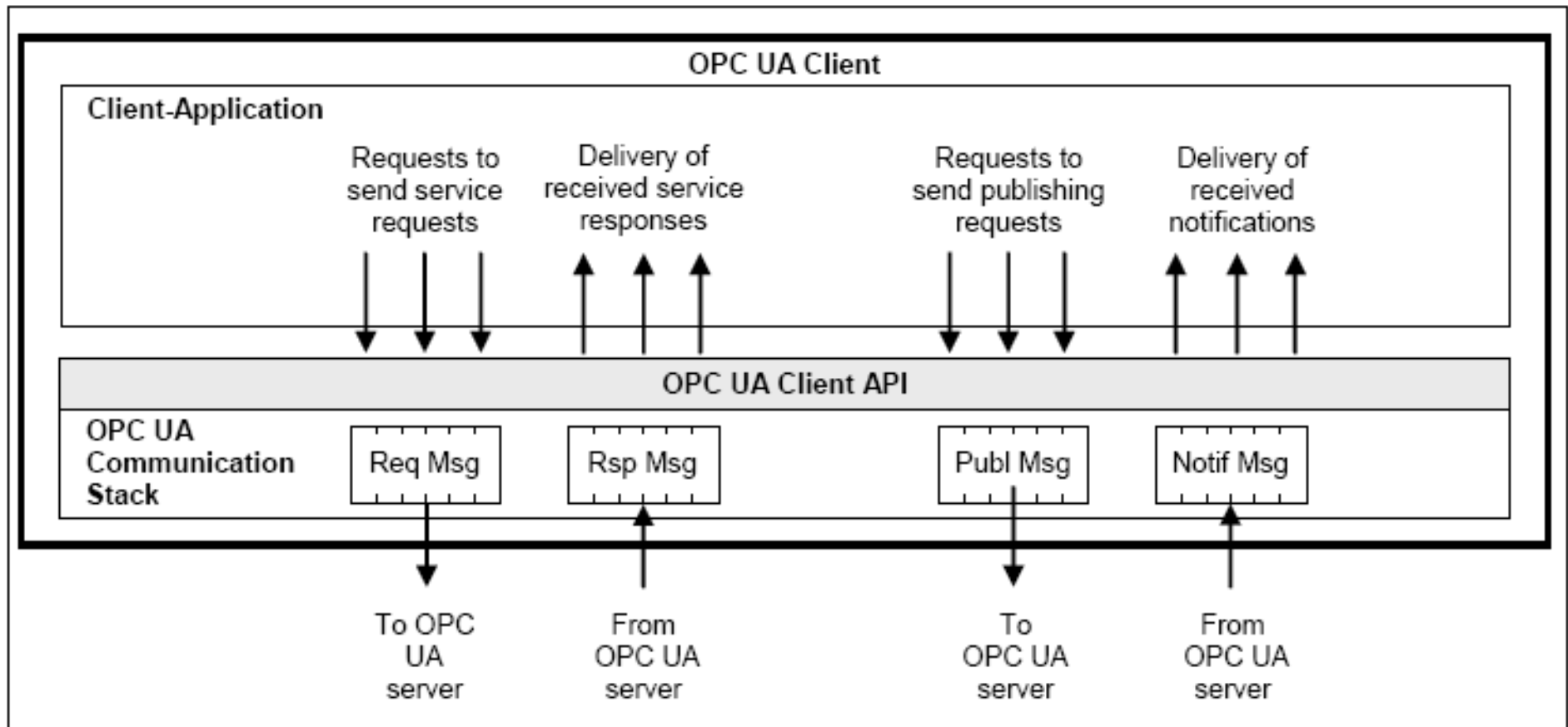
➤ many relationships between *Nodes*

OPC-UA target applications



UPC – Client Architecture

- Each *Client* may interact concurrently with one or more *Servers*. An application may combine *Server* and *Client* components to allow interaction with other *Servers* and *Clients*



UPC – Server Architecture

- Each *Server* may interact concurrently with one or more *Clients*
- The OPC UA systems architecture models OPC UA *Clients* and *Servers* as interacting partners. Each system may contain multiple *Clients* and *Servers*.

