Workshop Overview and PIER Research on Smart Grid

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Load Management Workshop Series

April 29, 2008	**Workshop on the Smart Grid Activities and Technology**
May 6, 2008	Comments due from public on April 29, 2008 Workshop
May 27, 2008	**Workshop on Advanced Meter Infrastructure (AMI)**
June 3, 2008	Comments due from public on May 27, 2008 Workshop
June 10, 2008	**Workshop on Rate Design, Incentives and Market Integration**
June 17, 08	Comments due from public on June 10, 2008 Workshop
June 19, 2008	**Workshop on Enabling Technologies and Communications**
June 26, 2008	Comments due from public on June 19, 2008 Workshop
July 10, 2008	**Workshop on Customer Education and Needs**
July 17, 2008	Comments due from public on July 10, 2008 Workshop
Early August	Staff Report and Recommendations for Load Management Standards
Late August	**Committee Hearing on Staff Report and Standards Recommendations**

Objective for Today's Workshop

- Discuss status of current Smart Grid technologies and initiatives
- Understand future Smart Grid plans
- Understanding better what needs to be done in the future
- Understand where load management standards are needed

PIER Research Ongoing at all Levels

Transmission

- Phasor Measurement
- Advanced displays
- Advanced comm & controls
- MRTU interface
- Energy Storage
- Renewables

Distribution

- Distribution Automation
- AMI
- Advanced C&C
- MRTU
- Energy Storage
- Renewables
- AMI

Integration

- Renewables
- Standards
- Protocols
- Reference designs
- Micro Grids
- Automation

Consumer

- Automating Demand Response
- AMI
- Dynamic Rates
- Home Area Networks
- Plug in Hybrids
- Renewables

Recent Smart Grid Research

To better understand:

1. What is the current status of the Smart Grid?
2. What new and emerging technologies are on the horizon that impacts the Smart Grid of the future?
3. How can we avoid incompatible systems being fielded that result in costly legacy systems that must be replaced much sooner than projected?
4. How do we help foster open access, competition and commercial growth of new and exciting technologies that provide California ratepayer new ways to meet their energy needs while at the same time saving them money?
5. Where can government help and where should government stay out?
6. What are the short, mid and long term Smart Grid infrastructure priorities for California?

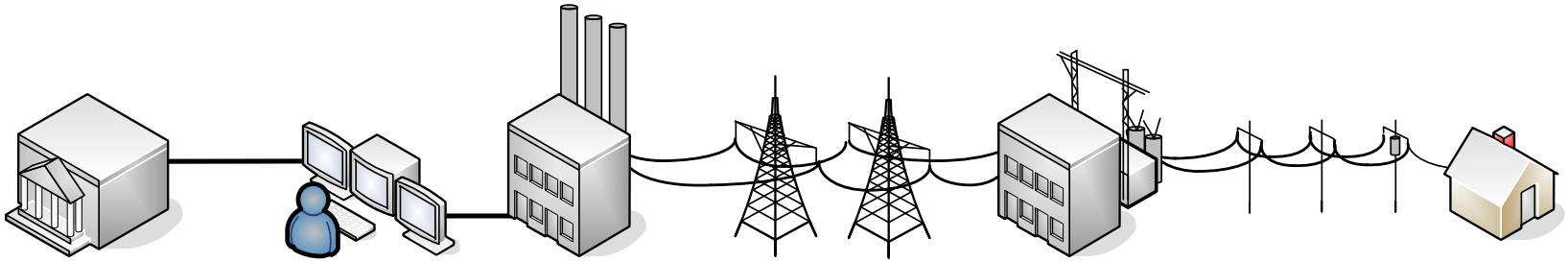
What is a Smart Grid?

The Energy Independence and Security Act of 2007: Extracts from Title XIII

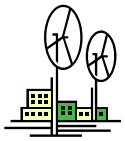
The Smart Grid includes:

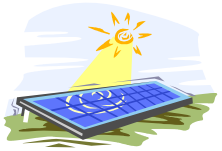
- Optimizing grid operations and resources to reflect the changing dynamics of the physical infrastructure and economic markets
- Cybersecurity
- Using and integrating distributed resources, demand side resources, and energy efficiency resources
- Deploying smart technologies for metering
- Communications of grid operations and status
- Distribution automation
- Integrating “smart” appliances and other consumer devices
- Deploying and integrating advanced electricity storage and peak-shaving technologies
- Transferring information to consumers in a timely manner to allow control decisions
- Developing standards for the communication and interoperability of appliances and equipment connected to the electric grid
- Identifying and lowering barriers to adoption of smart grid technologies, practices, and services

Merging Two Infrastructures

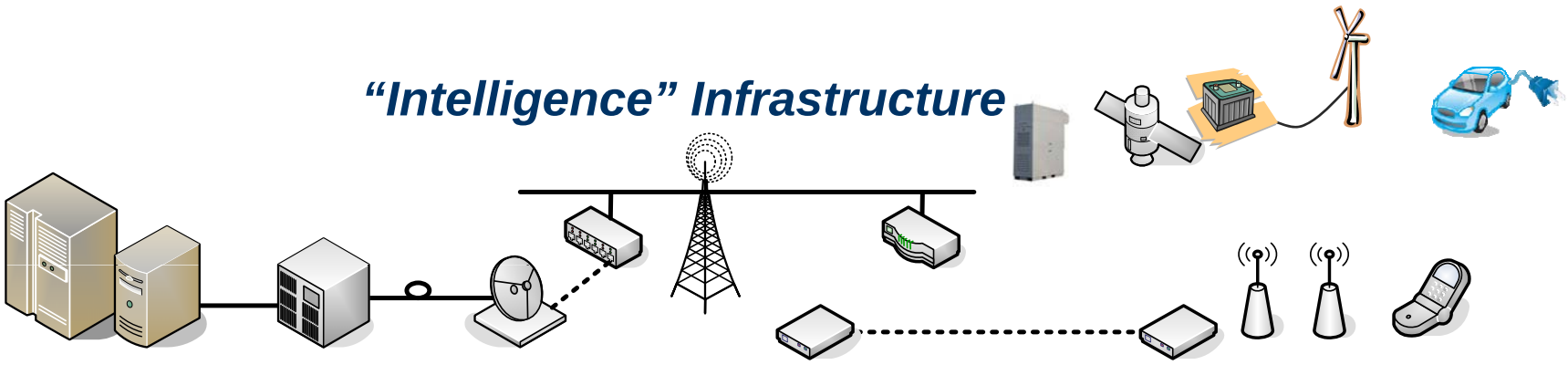


Electrical Infrastructure





"Intelligence" Infrastructure

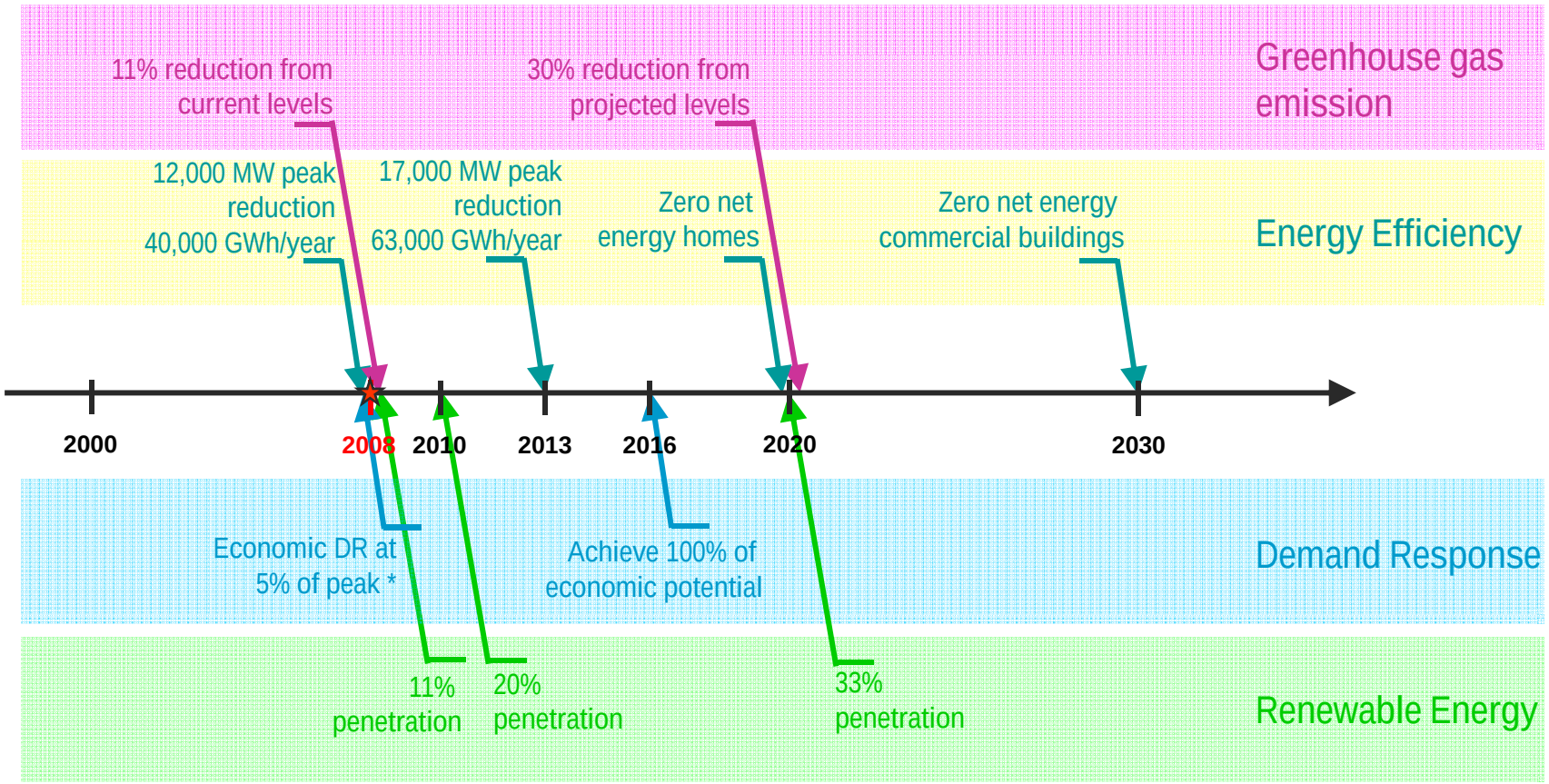


Why Smart Grid

- Improved Grid Operations
  - Higher Reliability
  - Less outage time / shorter outages / smarter decisions
  - More options to meet future needs
- Cleaner, Lower Costs Operations, More Efficient
  - New costs lowering technologies
  - Increased efficiency in operating existing systems
  - Meet needs with more environmentally preferred options
  - Higher utilization rates of installed systems
- More Options for Consumers
  - Lower overall energy costs
  - More choices on how to meet individual consumer needs
  - Dynamic rates to better integrated needs of grid and consumer
  - New technologies provide new demand side options

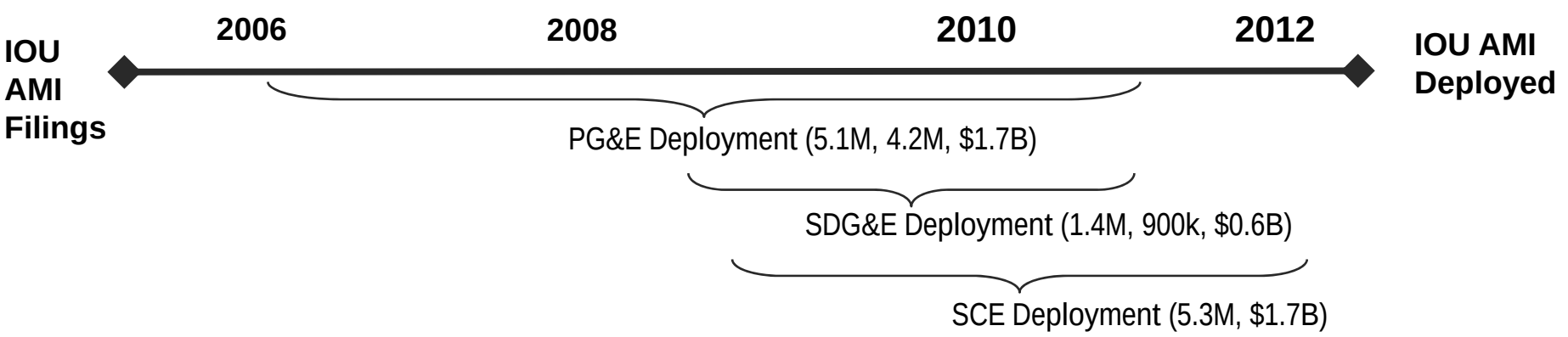
What is a Smart Grid for California?

California Energy Policy Targets



(*): 1,777 MW emergency DR - 1,106 MW price-triggered DR

California AMI Deployment



(Electric Meters, Gas Meters, Budget)

California Smart Grid Factors

- California energy policy
- Ongoing deployments
- California future energy growth needs
- California energy use profile

Research Recommendations

- Provide leadership role in defining Smart Grid
  - Bring together key stakeholders
  - Serve as conduit to definition
  - Develop coordinated and integrated definition

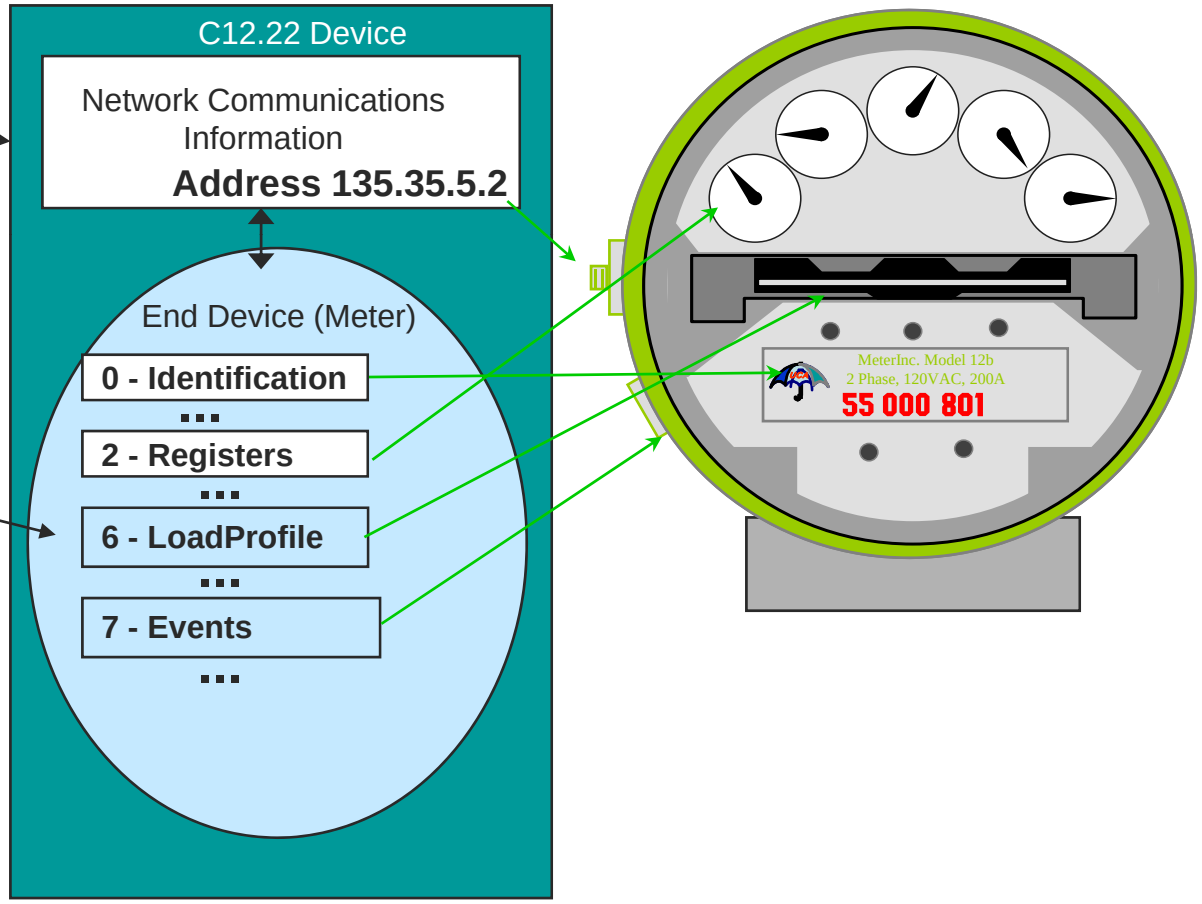
- Sponsor key Smart Grid field demonstrations
  - Demonstrate key technologies
  - Coordinate key integration demonstrations
  - Support open architecture
  - Coordinate critical infrastructure interface regulations, codes, and reference designs

Example of Key Concept for Smart Grid Architecture: Use a Common Language for Communications

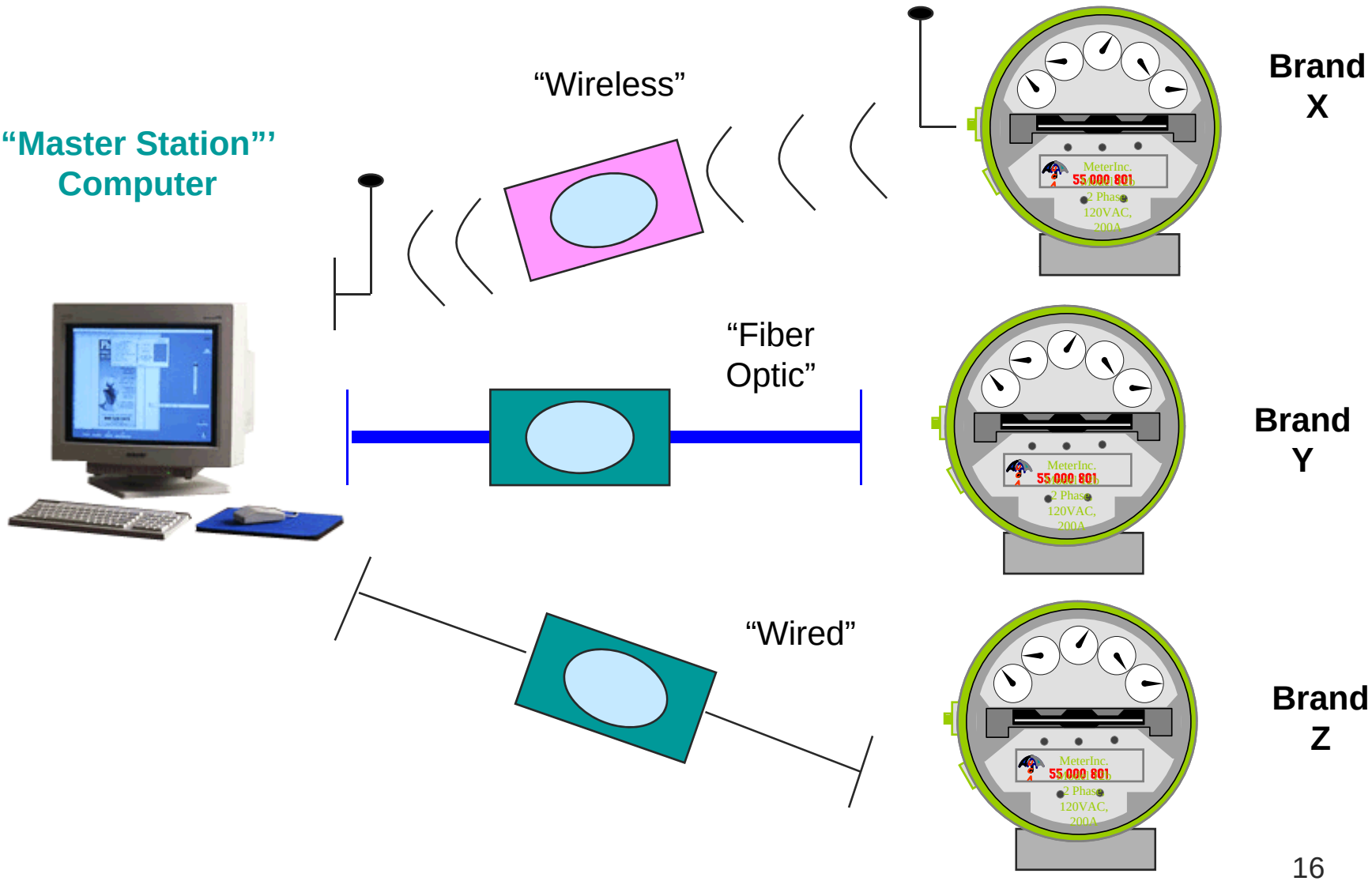
Data Packet **Revenue Meter**

ANSI Standard Communications **"Envelope"**

Meter Data Message **"Letter"**



Example Recommendation: Develop Designs that Make Use of Layered Communications…



Follow-up Questions

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