Smart Grid Interoperability—What's Different This Time?
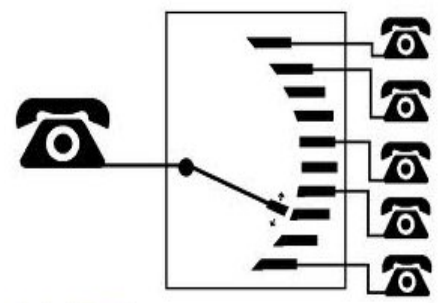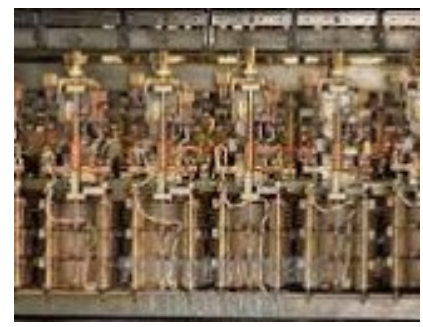
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- ## System complexity?
  - System of Systems and integration challenges?
- ## Regulated monopoly structure?
- ## Obligation to serve?
- ## Regulated rate of return?
- ## Diversity of products?
- ## Regulatory fragmentation and complexity?
- ## Technology maturity?
- ## Lack of political support?
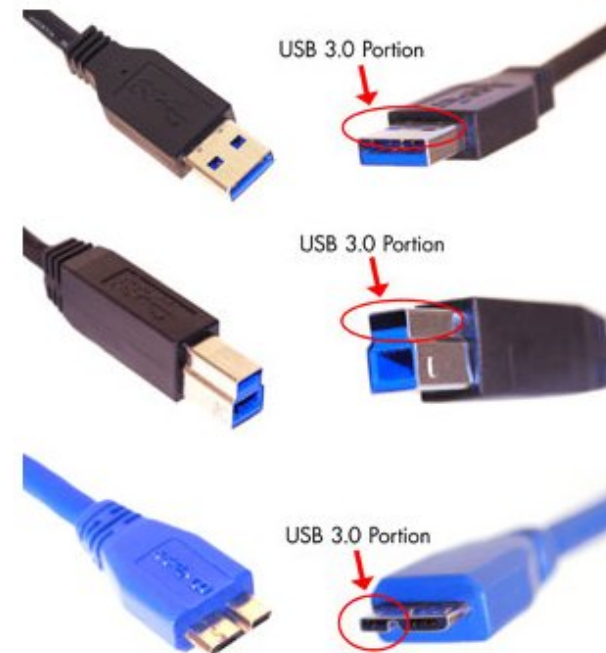- ## Lack of public understanding?

- Backward compatibility
- Component interchangeability
- Complementary product interoperability
- Mobile interoperation
- Bandwidth and latency
- Regulatory regimes
- Changing industry "metabolism"

Definition: the ability of a new system or solution to integrate with existing and legacy systems that are still operational

Example: rise of departmental computing, then of PC business in 1980s

Similarity: entrenched, powerful competitors (e.g., IBM, Sperry…) with established relationships

Difference: competitive, unregulated marketplace for technology

Gabriel 17 Sep 2004

Heather 15 Oct 1965

Chris 22 Nov 1965

USB 3.0 Portion

USB 3.0 Portion

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Definition: the ability to remove a component from an integrated system and replace it with a like component with minimal cost and disruption

Example: telephone network interconnect: RJ-11 interface

Similarity: regulated monopoly protecting integrity of its system and business

Difference: court case mandating the network be opened for device interconnection; another allowing long distance competition

Definition: allows a technology or solution to integrate with other technologies or solutions where the combination of the two provides added value

Example: content in MPEG2/4 or Flash with available, connected viewers (smart phone, TV, computer)

Similarity: industry consortia trying to define a common path forward; e.g., appliance manufacturers and HAN technology

**Difference**: jurisdictional differences on key component of value, DR based compensation (for utility channel)

VHS ß

Definition: provides the ability to operate, as needed, with systems in different geographical areas

Example: mobile phone and computing industry, new location services, etc.

Similarity: federal (FCC) and state (PUCs), and local (e.g., building codes) jurisdictional regulatory structure. Billing & rating, etc.

Difference: two infrastructures, power and information, to manage and coordinate. Obligation to serve.

EV
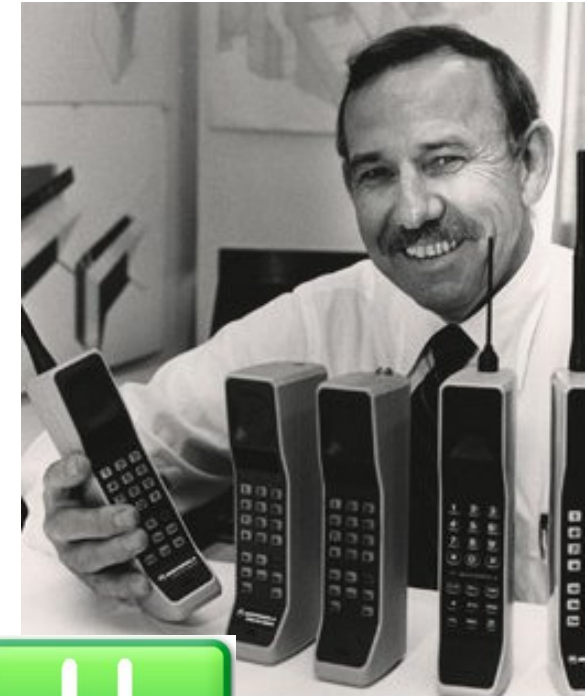
Definition: characteristics of communication channels that require careful consideration for certain applications (information volume & response time)

Example: IP voice and video (low latency for voice, high bandwidth for video)

Similarity: history of application specific networks and network requirements; critical infrastructure.

Difference: jurisdictional boundaries and regulated rate of return

The relationship between the utilities and their regulators, often referred to as the "regulatory compact," was developed in the mid-twentieth century.

Lost Revenue Adjustment & Revenue Decoupling Mechanisms for Electric Utilities by State

Legend:
- Decoupling Approved or Pilot
- Decoupling Pending
- Lost Revenue Adjustment Mechanism

Source: Edison Foundation, Institute for Energy Efficiency. 2010. "State Efficiency Regulatory Frameworks."

- Today, who is a tortoise, and who is a hare?

- Utilities are changing

- Deregulating tends to make markets move faster (at least change faster)

- Many of the technical issues and challenges have been seen in previous industry transformations

- Some of the regulatory and structural issues have been seen as well

- But, these structural and regulatory challenges must be addressed to allow technology to meet the promise of the smart grid

"You get a certain ROI if you build a new power station. If you get that same ROI or even half a percentage point higher, that will completely change the business model. It might be a lot cheaper, and a better investment, to moderate energy growth"*
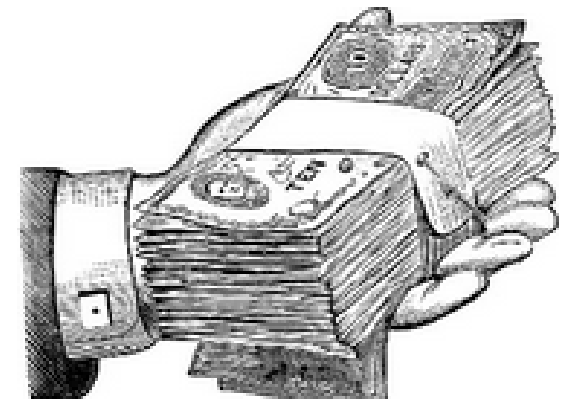
*U.S. Secretary of Energy, Stephen Chu, and at the GridWise Global Forum in Washington D.C., November 8, 2011.