AEMC Briefing

Introduction to Open Access and Communication Standards

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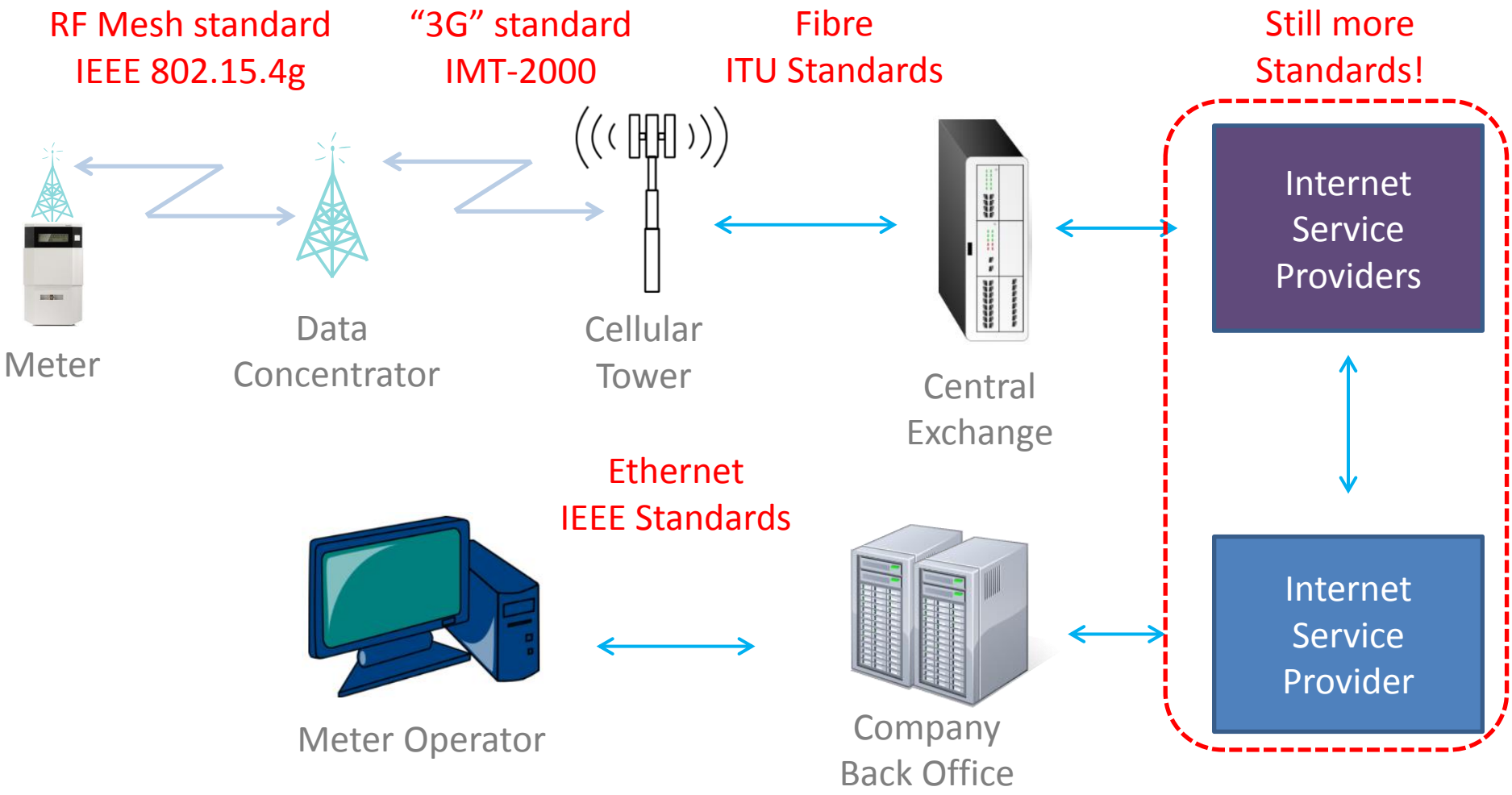
Phacelift

1. Introduction to Communications
   a) As an introduction to Open Access (and Interoperability)
2. Framework supporting discussions on
   a) Open Access and
   b) Interoperability
3. Questions

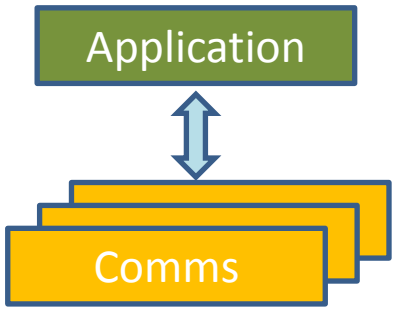
Modern comms use lots of physical links, and …

Multiple Standards



Do we need to know how the internet works to use it?

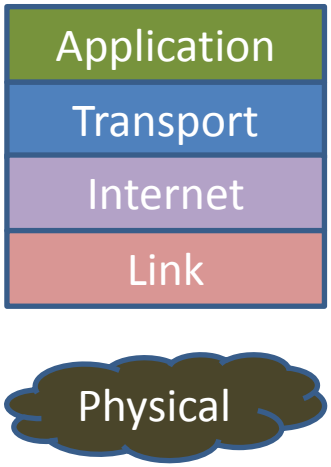
- Modern software applications can use multiple communications options to access the internet
  - ➢ For example using the same web browser with:
    - → Company Ethernet
    - → Home ADSL or
    - → USB cellular modem
- This is because the **Application** (web browser) is developed independently of the communications



This introduces the concept of 'layers'

Internet Layers Model

- Upper layers send information to lower layers
- The interface between different layers defines
  - What is sent and
  - How the lower layers respond



Process-to-Process Communications

Host-to-Host Communications

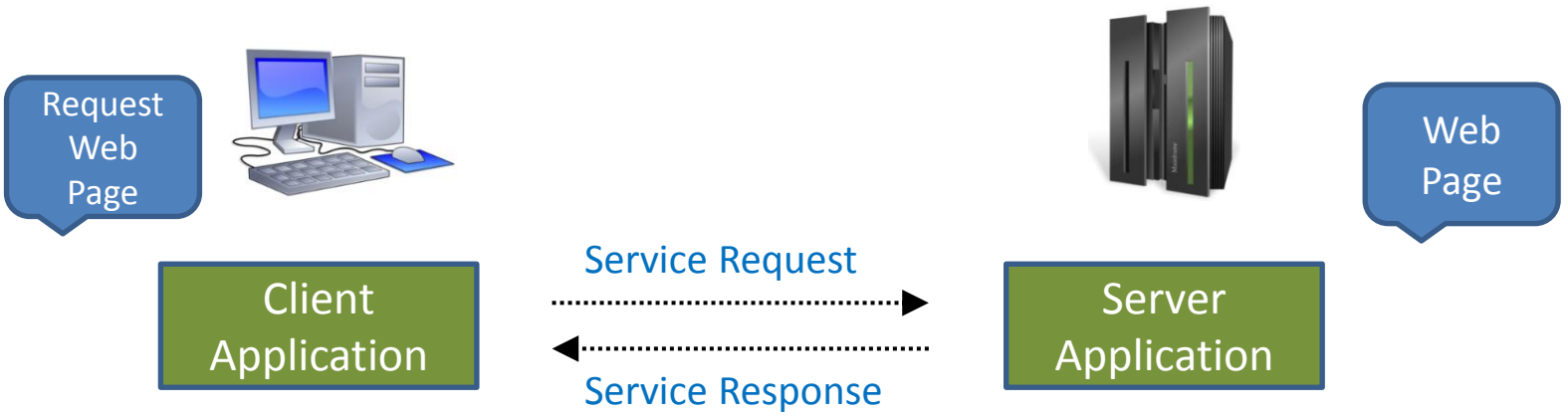
Send Packets across (multiple) networks (inter-networking)

Sends Packets across a single link

How messages are sent over a physical connection
(e.g. voltages, frequency)

Example 1

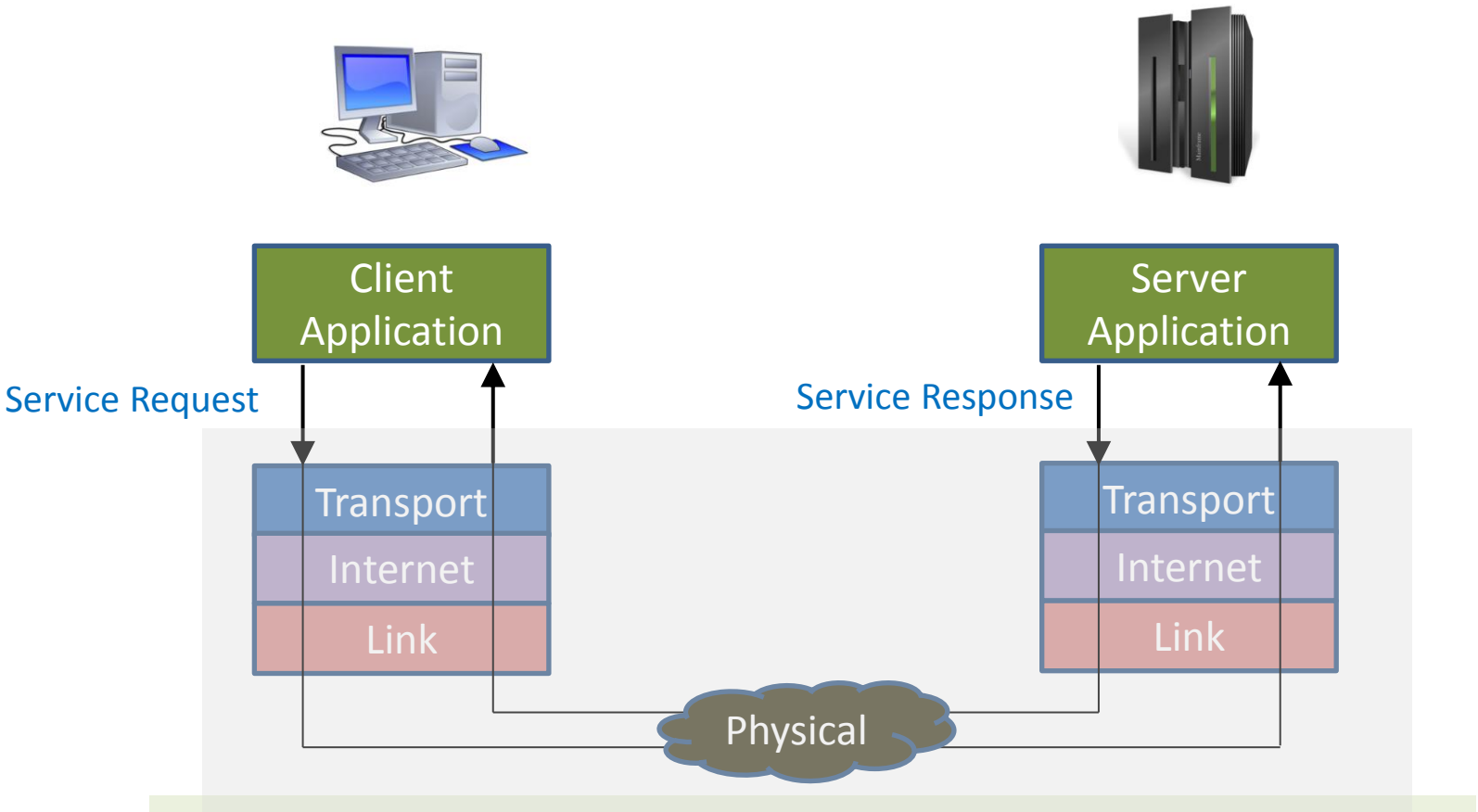
- A Web browser (**Client Application)** running on a computer **requests** information from a **Server Application**



- When the **Server Application** receives the request it sends a **response** back to the **Client Application**

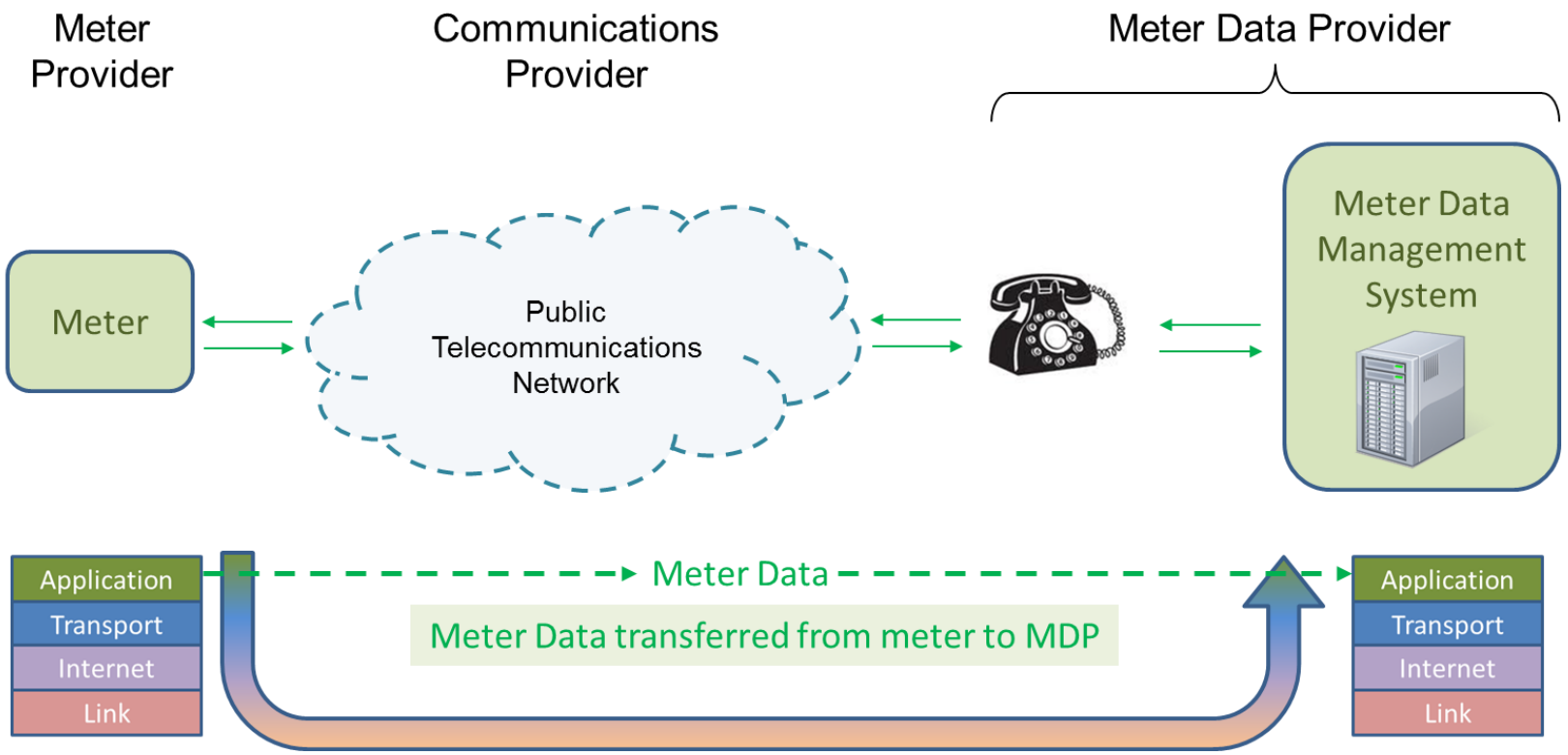
Example 1 (cont'd)

- The **Application** relies on communications being provided by the lower layers



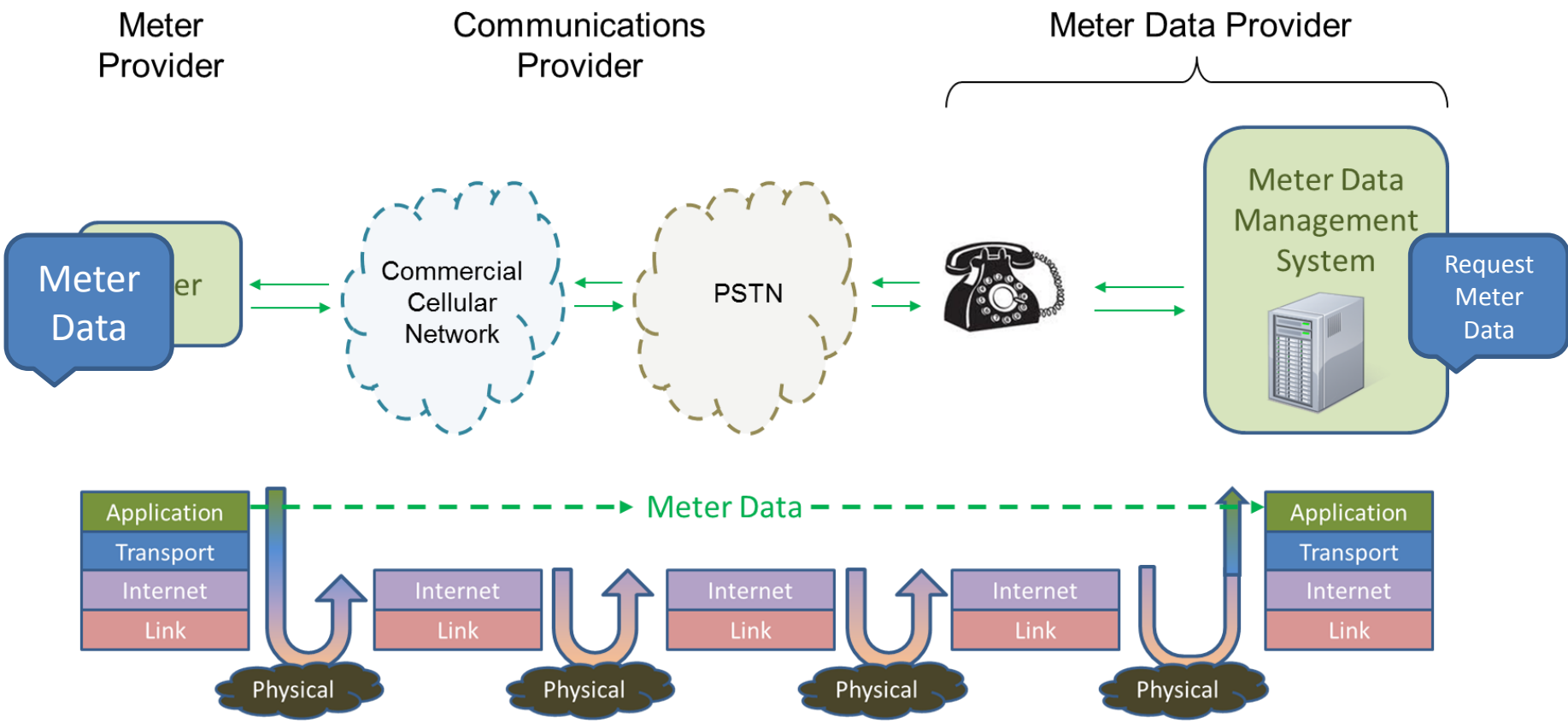
Complexity of the actual communications is "hidden"

Example 2



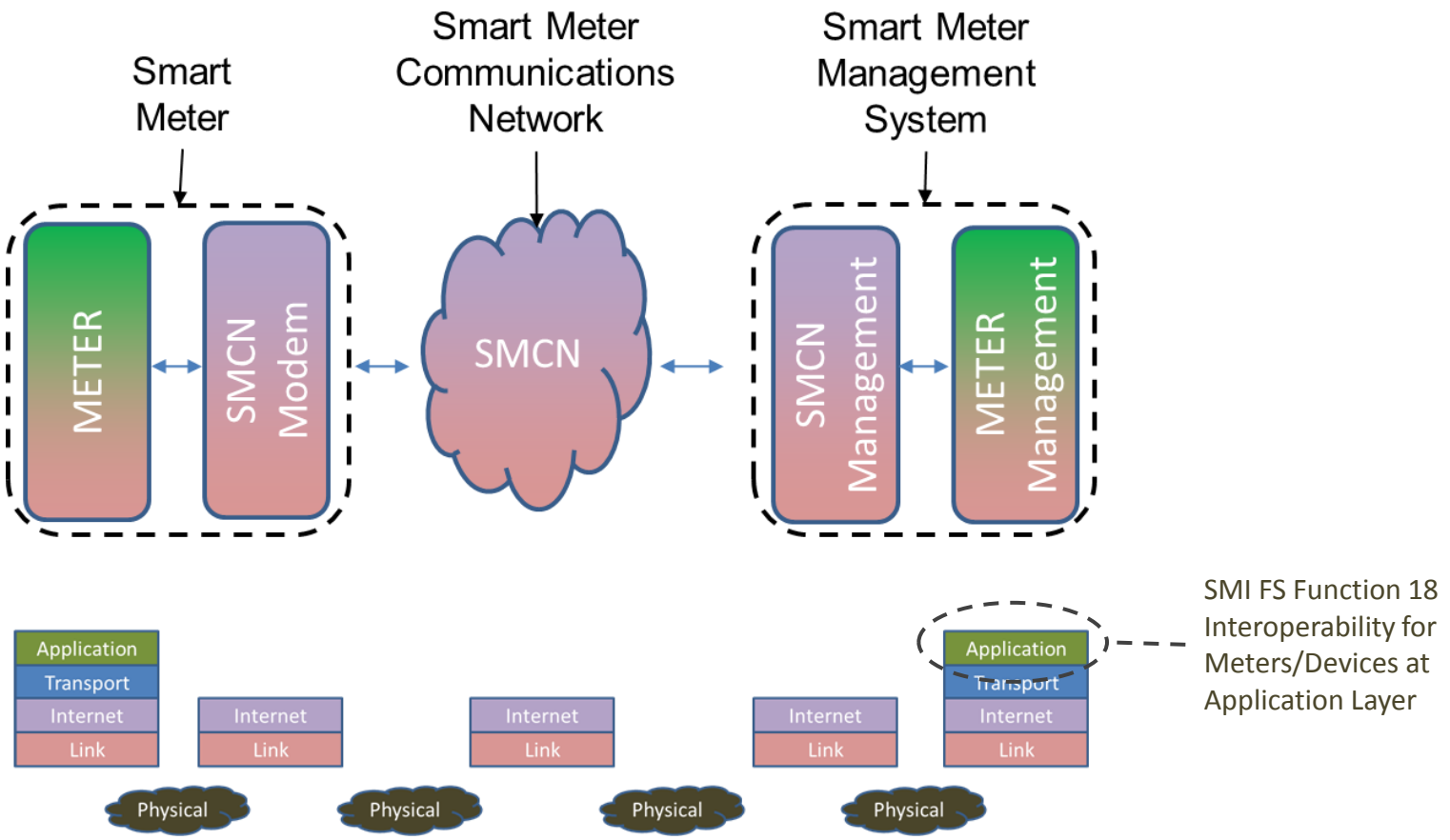
Simplified view of remote meter reading (Type 1 to 4)

Example 2 (cont'd)

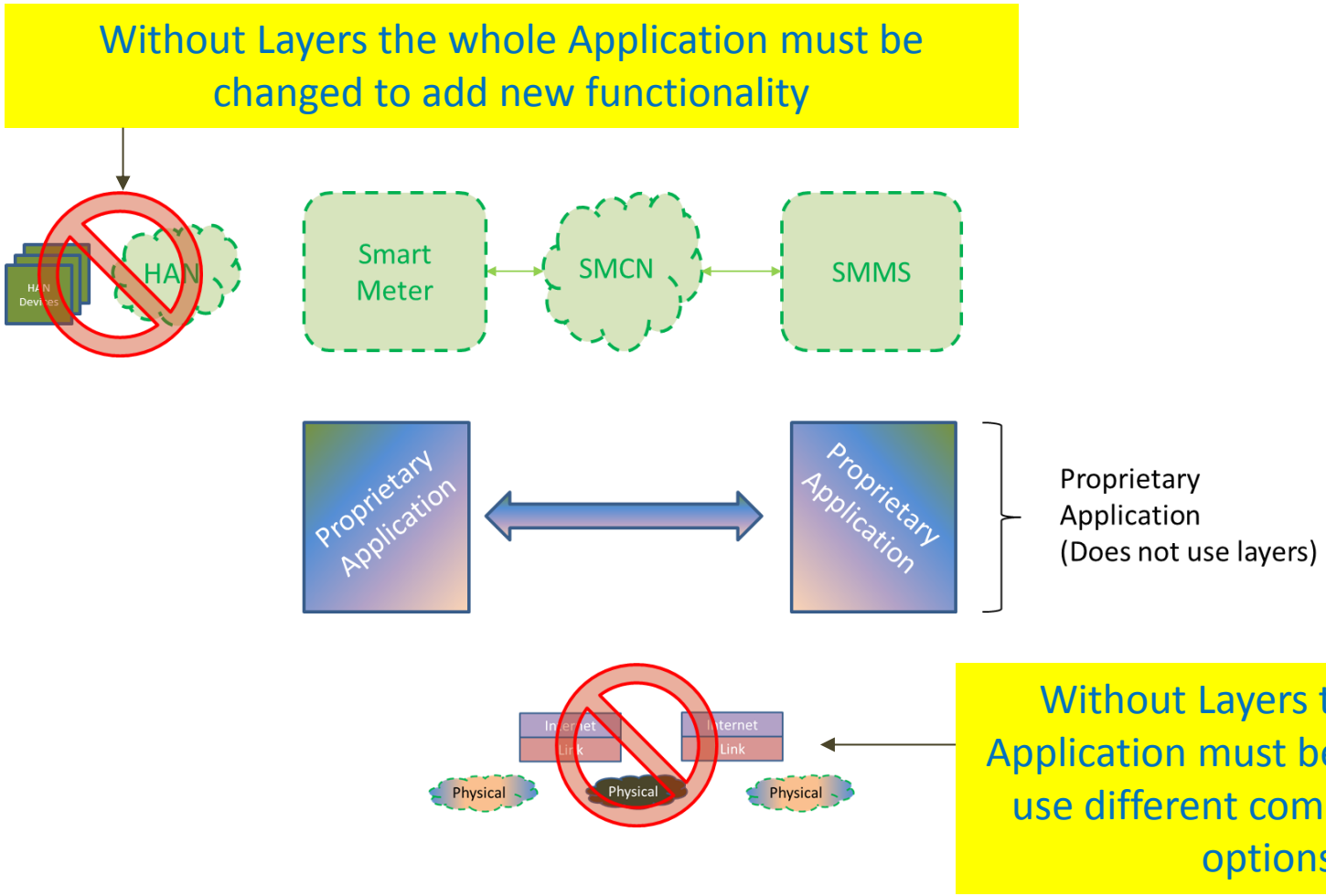


Showing some of the interfaces in the end-to-end process

When Smart Meters use the Internet Layers

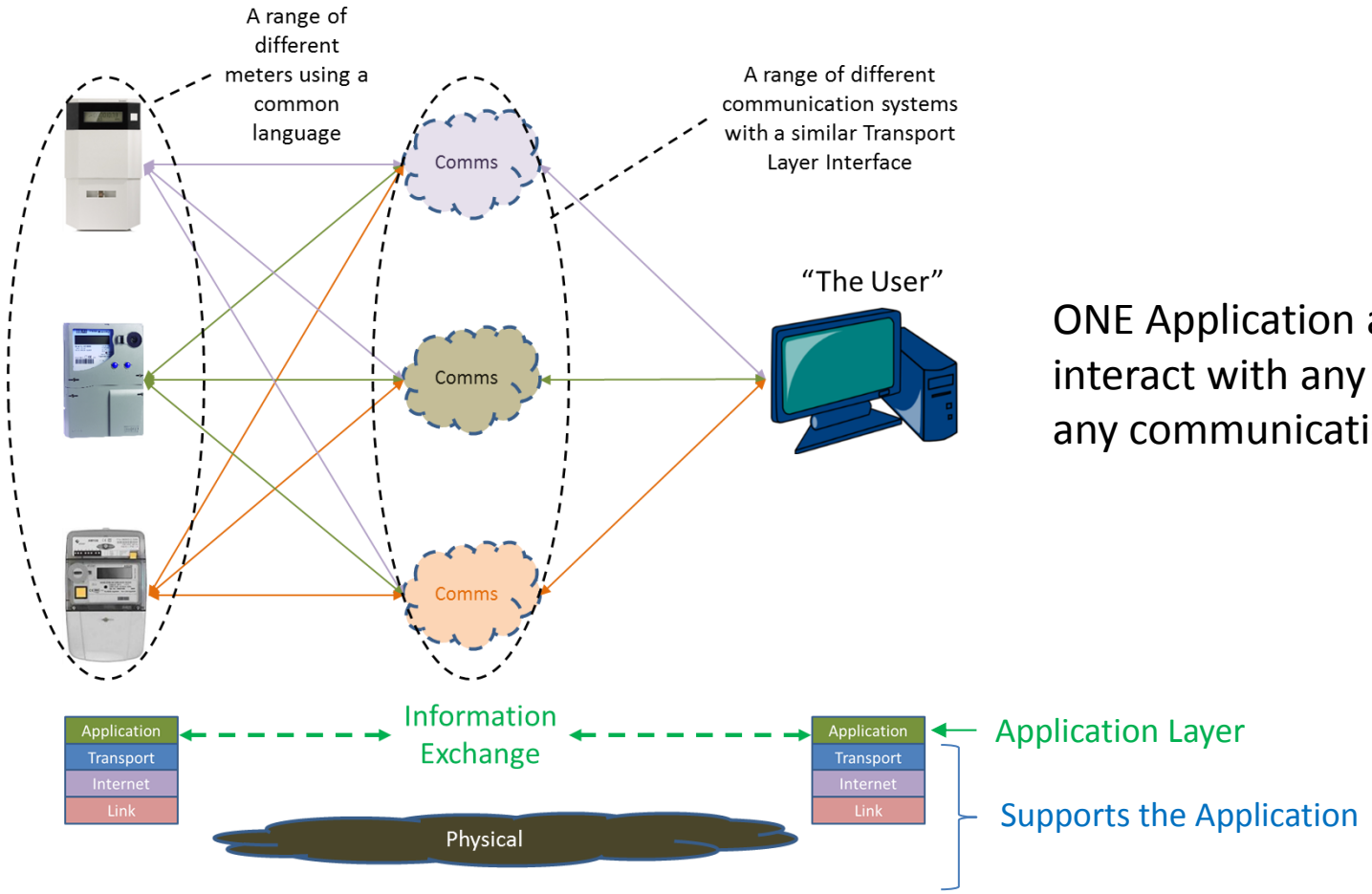


When Smart Meters don't use the Internet Layers



The advantage of using Layers is …

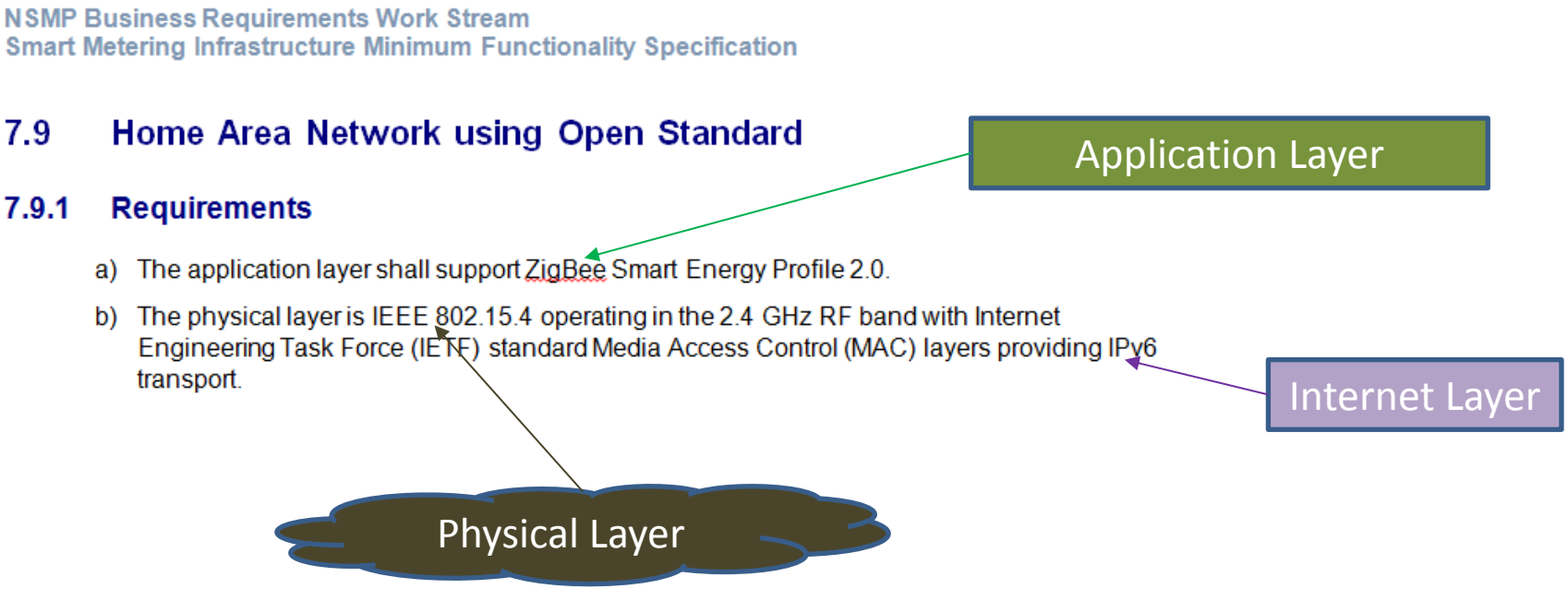
- Using Layers separates the selection of the Application from the Communications



ONE Application able to interact with any meter via any communications option

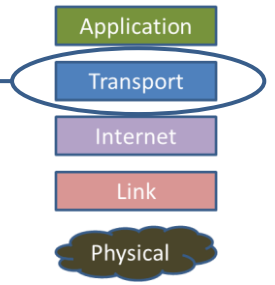
Example using Internet Layers

- The Smart Metering Infrastructure Functional Specification (SMI FS) separately specifies the HAN Application Layer from other layers



Choosing Communication Standards

- At Each Layer of the Internet Layers Model we are offered a choice of standards
- For example at the Transport Layer
  - TCP standard – reliable communications standard
  - UDP standard – unreliable communications standard



Supports broadcast

May add significant data overheads

UDP – User Datagram Protocol (IETF RFC 768)
TCP – Transmission Control Protocol (IETF RFC 675 + other extensions)

But the task is made easier because:

- Typically the Application defines the Communications Layers
  - e.g. DLMS/COSEM

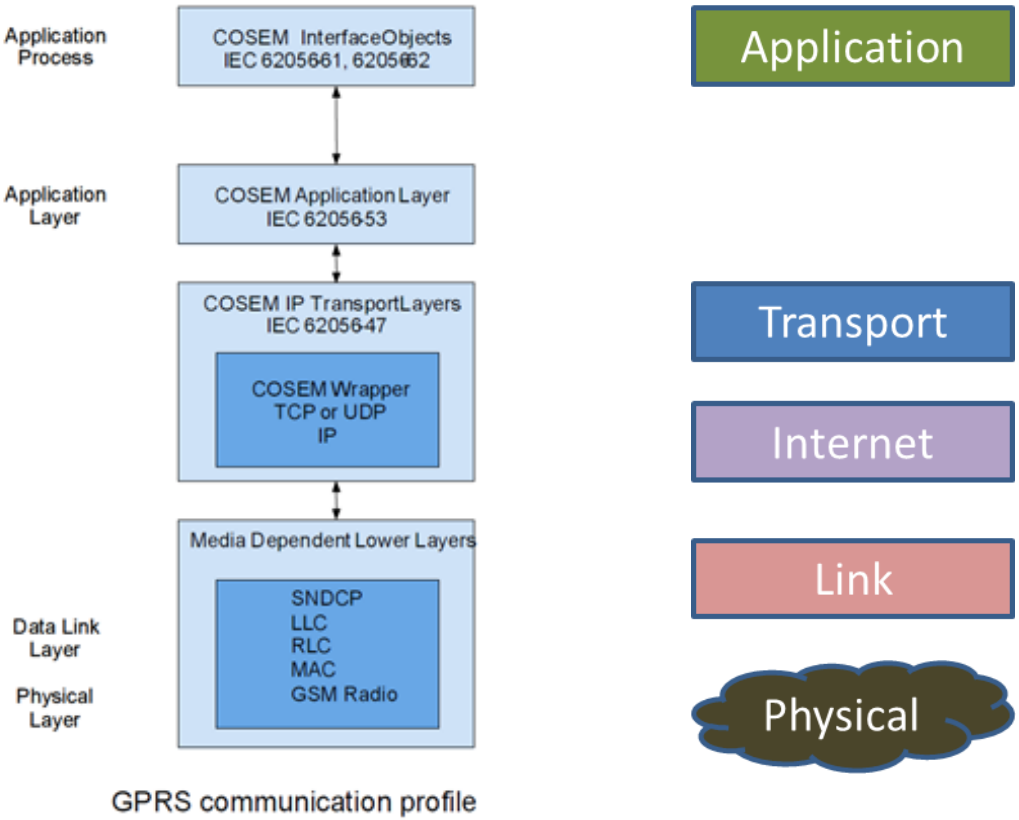
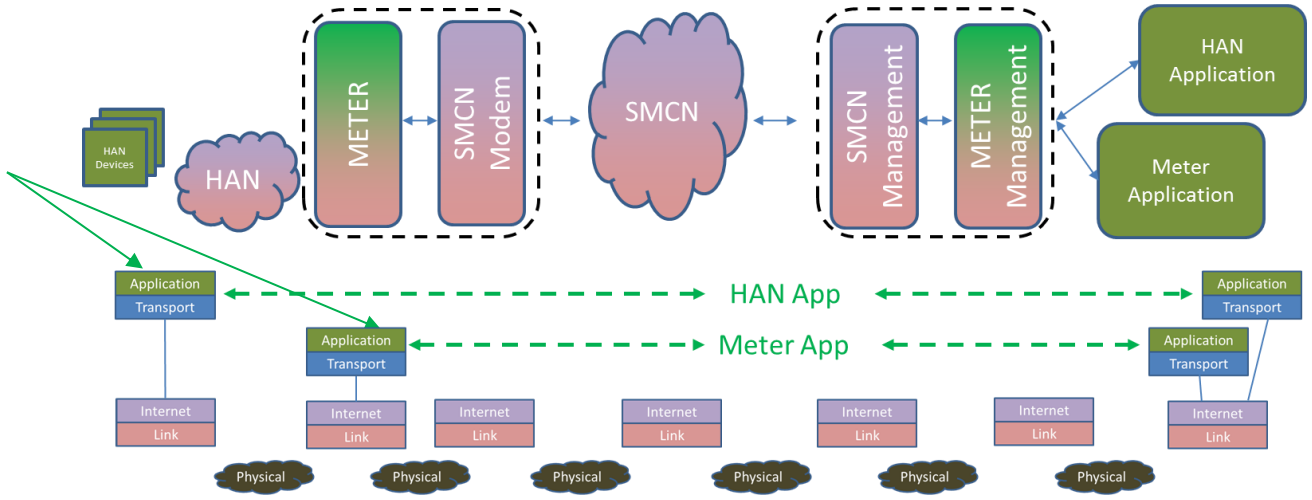


Figure 3.2 from COSEM Interface Objects (DLMS User Association)

How are multiple applications accommodated?

- Consider two Applications :
  - Meter Application (e.g. DLMS or ANSI C12)
  - HAN Application (e.g. ZigBee SEP 2 or ECHONET)

Showing Two Applications



Choosing the Application standard

"The nice thing about standards is that you have so many to choose from."

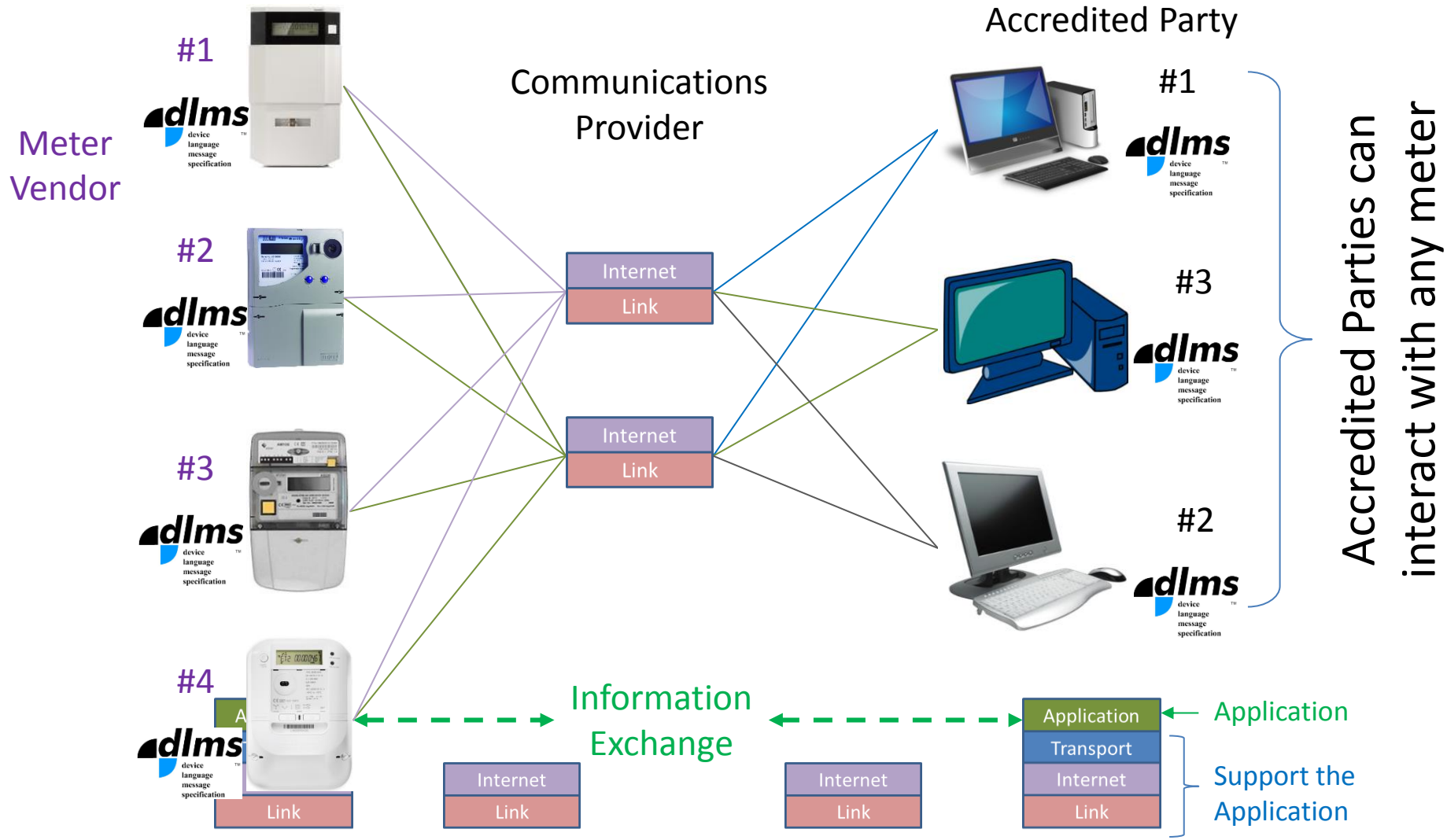
-- Andrew S. Tanenbaum, Computer Networks

- When considering a meter protocol there are two leading open non-proprietary choices

DLMS/COSEM

ANSI C12

The advantage of selecting common Applications

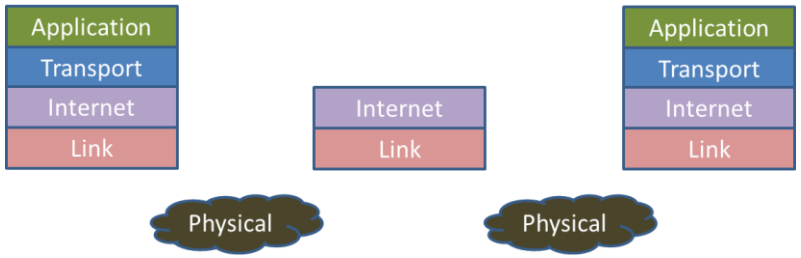


This slide shows the DLMS meter protocol but it is acknowledged that other standards provide similar advantages

Open Access and Interoperability

Introduction 1

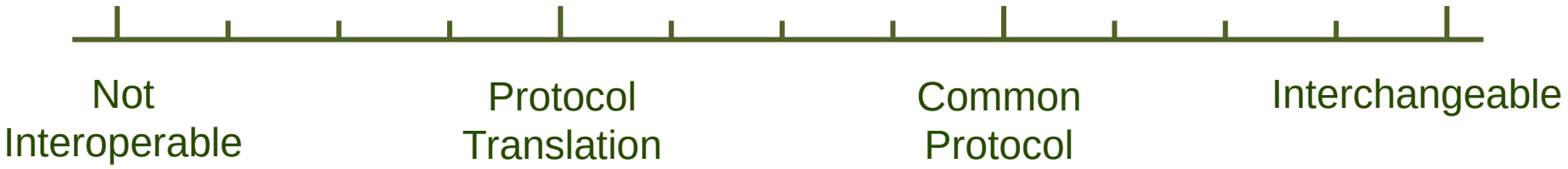
- Access
  - ➢ Access generally differs depending on the observer's view of the end-to-end process. In most cases we are considering access between
    - → The Accredited Party and
    - → The installed technology
- Interoperability
  - ➢ Modern meter protocols describe the two ends of the 'end-to-end' process
  - ➢ These rely on the Internet Layers Model to separate the Application from the various communications layers
  - ➢ The use of these standards enables communication technology to fill in the gap between the two ends



Introduction 2

- We need a common language to describe the concepts
- The extremes are easily defined
  - e.g. Access can be Open or Closed
- Here we propose the use of a “Spectrum” to describe the points falling between the extremes

Interoperability Spectrum



- **Not Interoperable**
  - No ability to interact with the meter (e.g. Unpublished proprietary protocol)
- **Protocol Translation**
  - Able to interact with the meter by converting protocols, however there may be some loss of functionality e.g. Itron MV90 is only able to read meter data it cannot alter meter settings
- **Common Protocol**
  - All meters use a common protocol so Accredited Parties are able to interact with all meters without loss of functionality (may offer different functionality)
- **Interchangeable**
  - One meter can be swapped with another with no system impacts. No need to change Head End Systems or communications (also referred to as “Fully Interoperable”)

Smart Meter Functionality

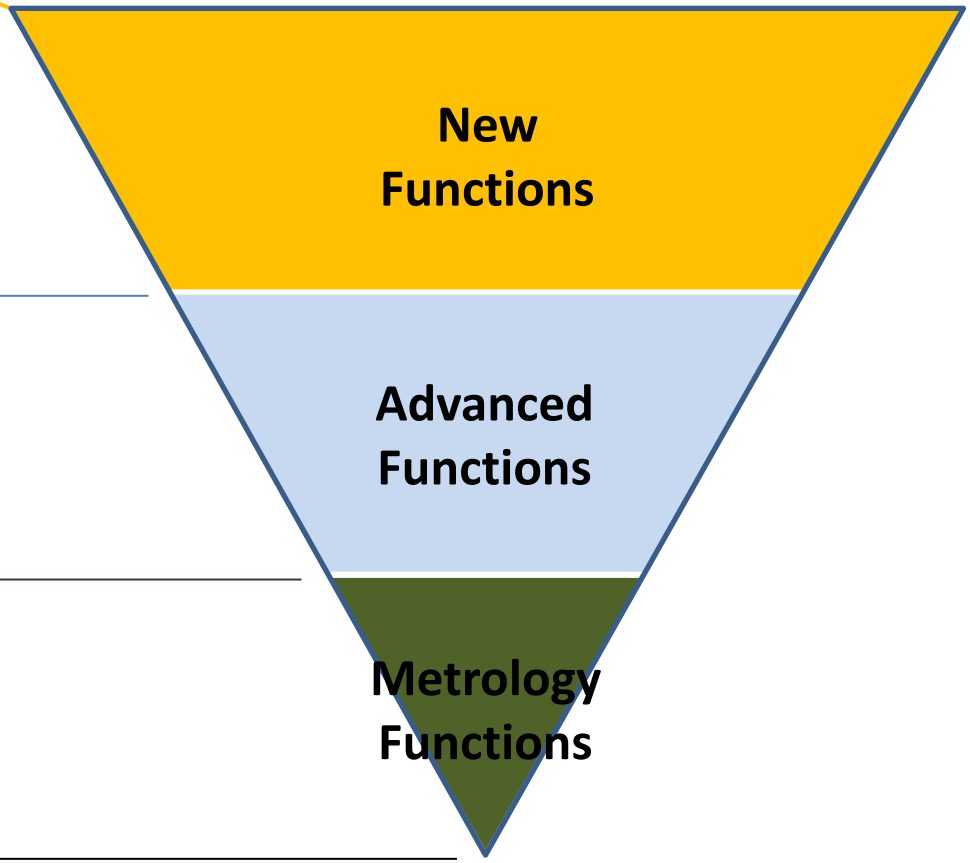
Over time more new functions will be offered

Upper functions build on lower functions (need access)

New (and specialist) Functions
e.g. Inverter Power Factor control

Advanced Functions typically found in Smart Meters and recognised in the Rules e.g. Enabling HAN devices

Functionality required to support the market and sufficiently stable to be documented in the Rules



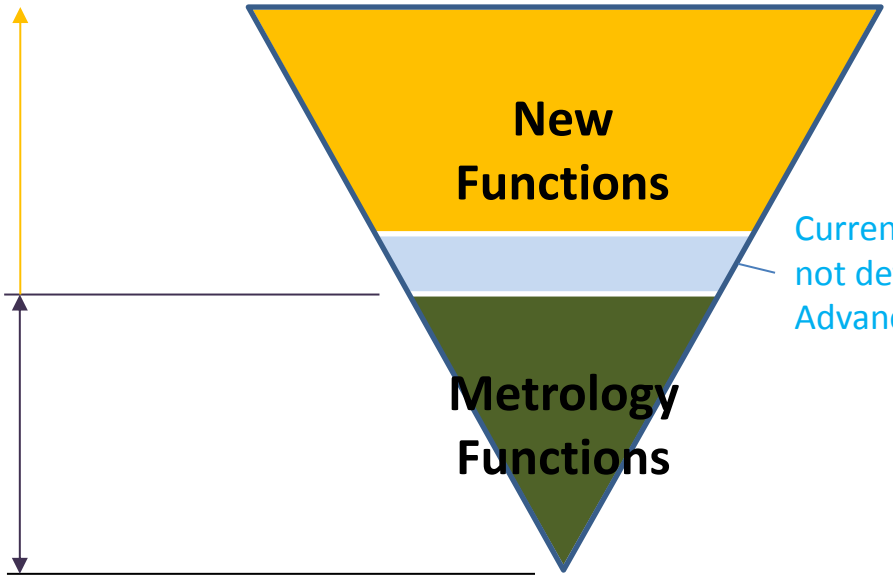
Current National Electricity Rules

National Electricity Rules 7.3.1 (c) allows for New Functions

> Either a *Local Network Service Provider* or a *Market Participant* may, with the agreement of the *responsible person* (which cannot be unreasonably withheld), arrange for a *metering installation* to contain features in addition to, or which enhance, the features specified in paragraph (b).

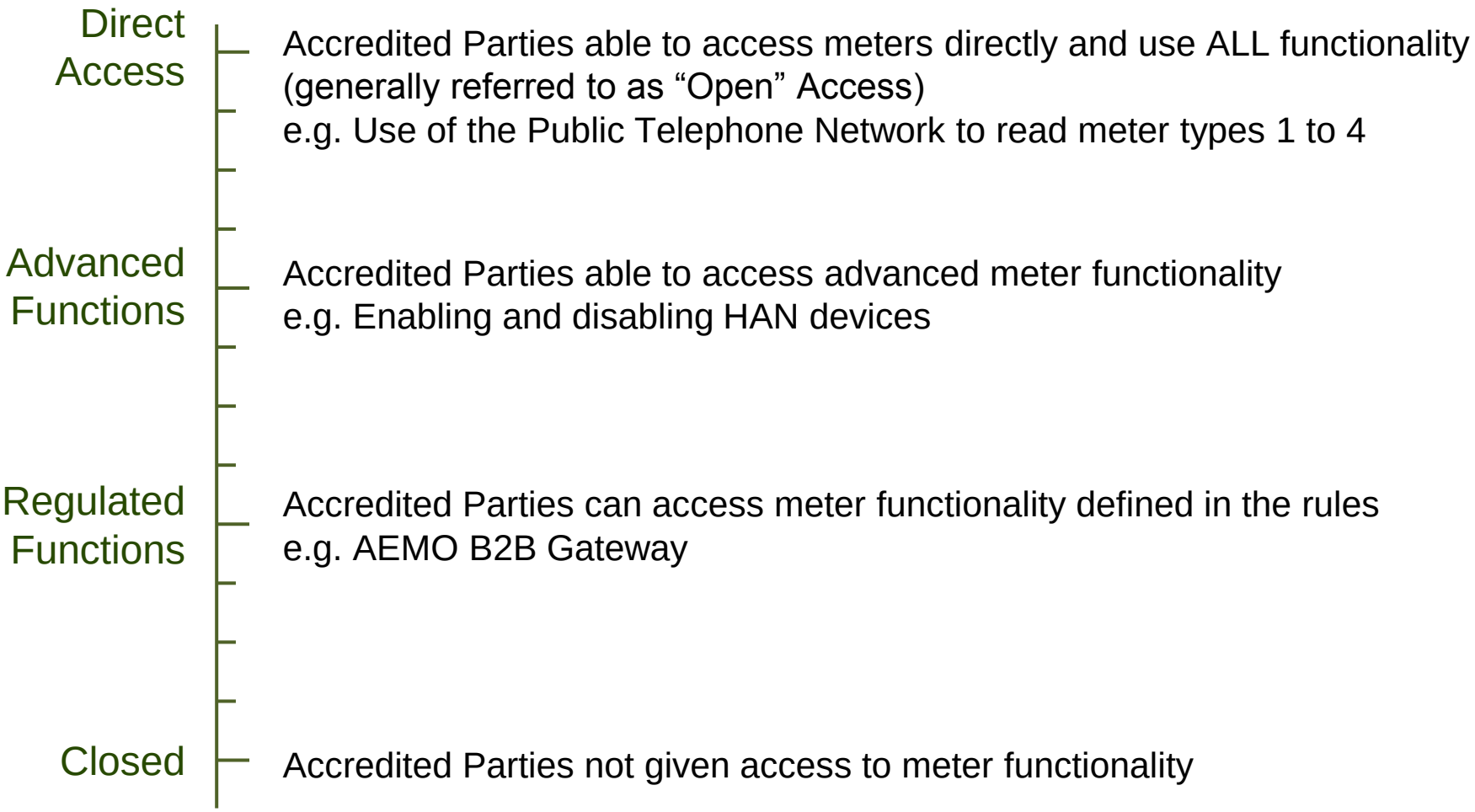
New (and enhanced) Functions not defined in the Rules

Functionality required to support the market and sufficiently stable to be documented in the Rules

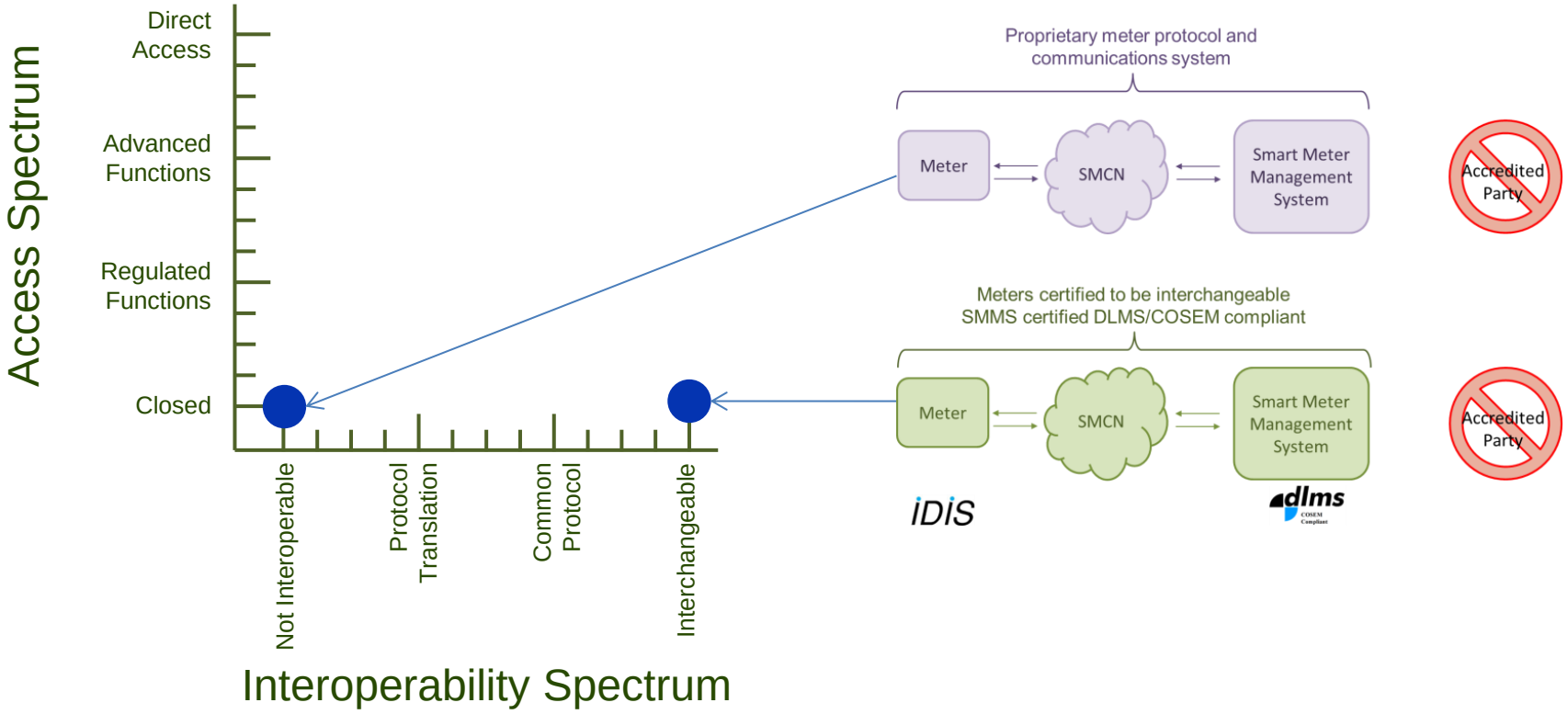


Currently the rules do not define any Advanced Functions

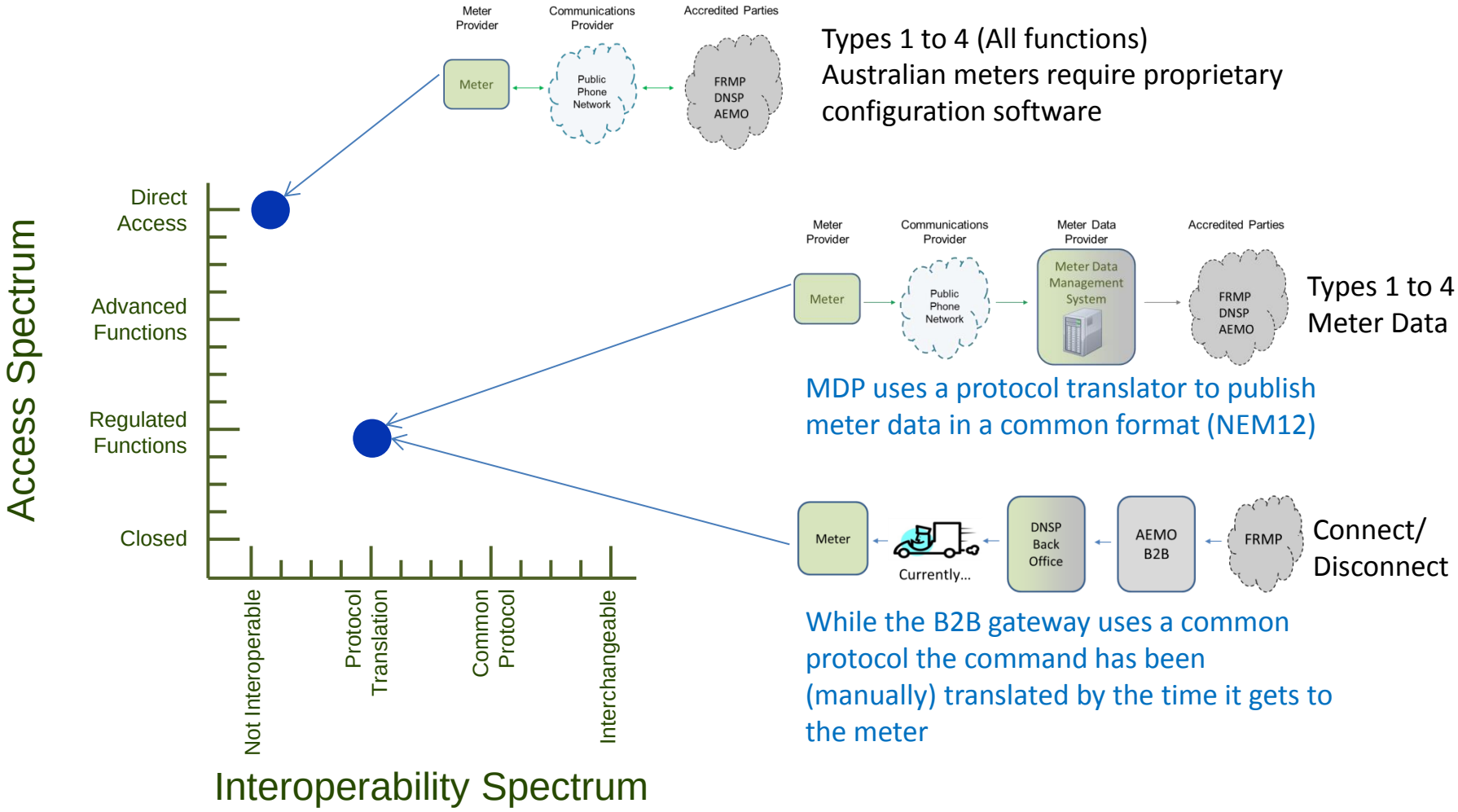
Access to Meter Functionality



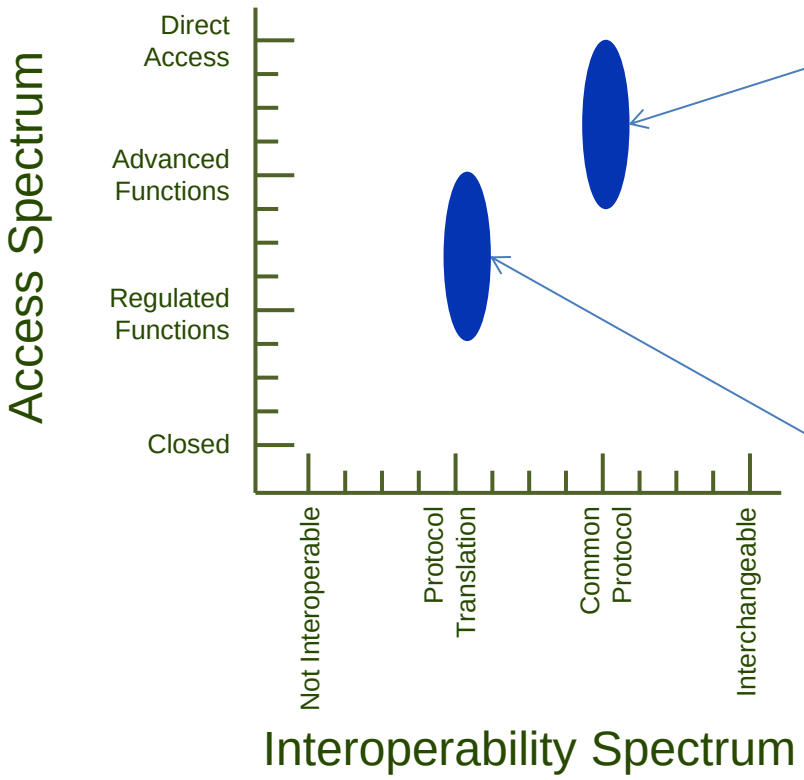
Access and Interoperability are independent



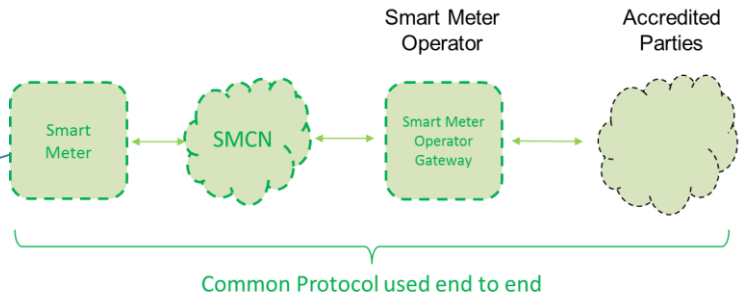
Access and Interoperability in the NEM



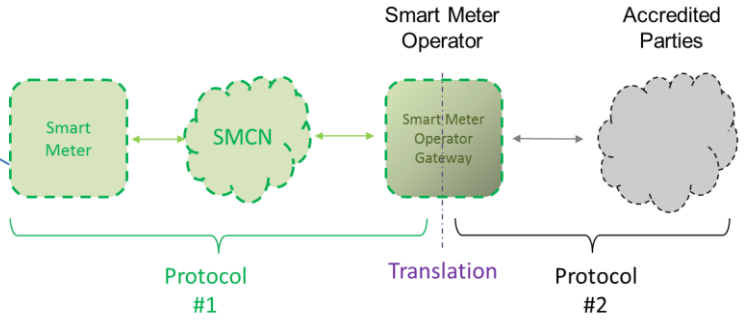
Access with and without a common protocol



Examples

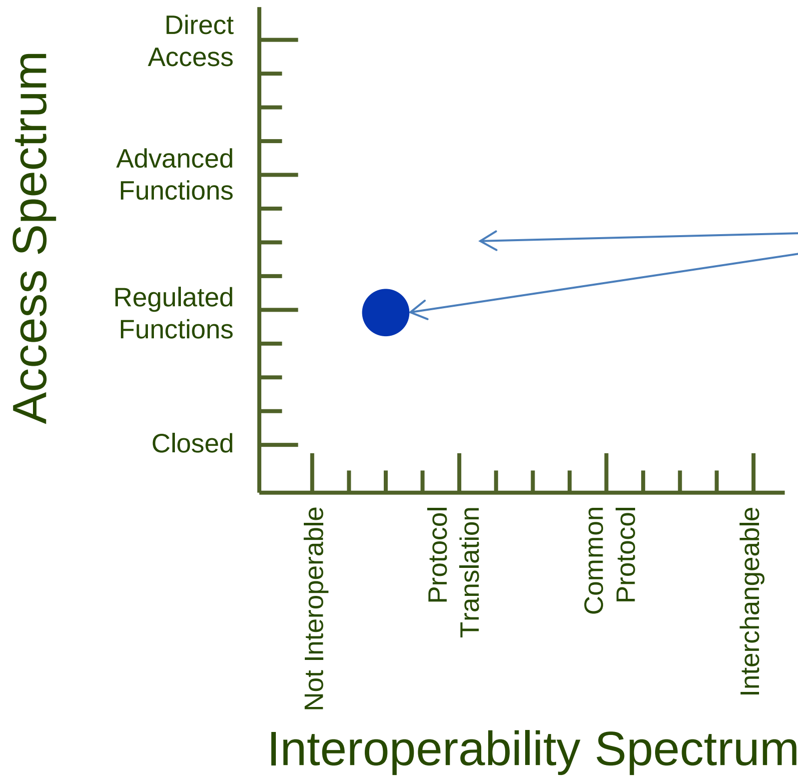


Accredited Party can interact directly with the specified smart meter supporting use of New Functions



The software performing the Protocol Translation is unlikely to support New Functions

Victorian AMI Rollout



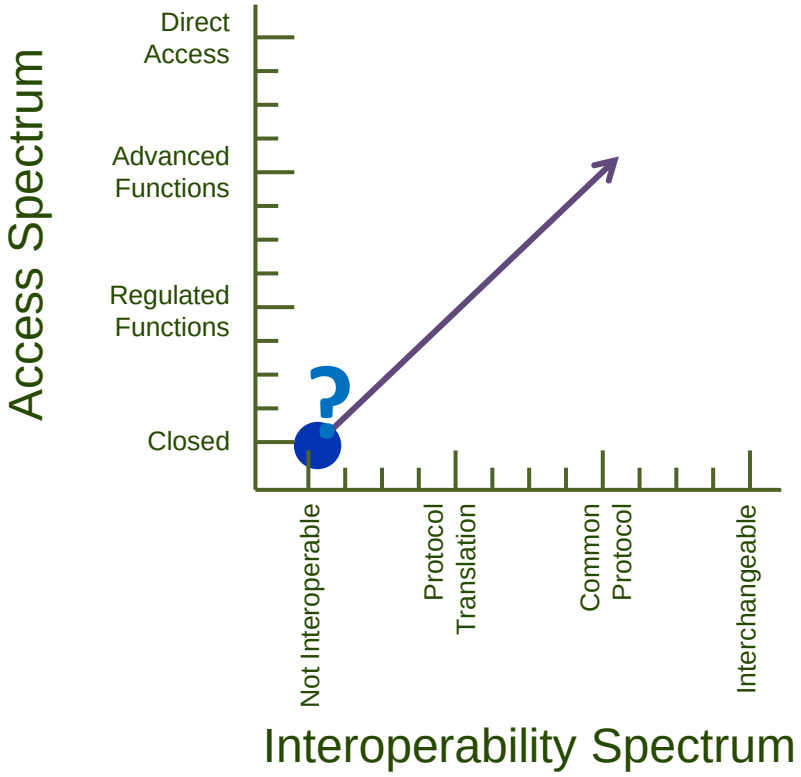
Initially Accredited Parties only provided access to the regulated functions of dis/re-connect and meter data

Currently DNSPs are offering Accredited Parties access to some HAN functionality

As confidence in their AMI systems has improved they have progressively transitioned to a more open position

The Power of Choice

What is required to support the Power of Choice (PoC)?



The contestable provision of smart meters implies a single meter protocol offers advantages

Technologies are available that can support this shift to a more open position

Questions