

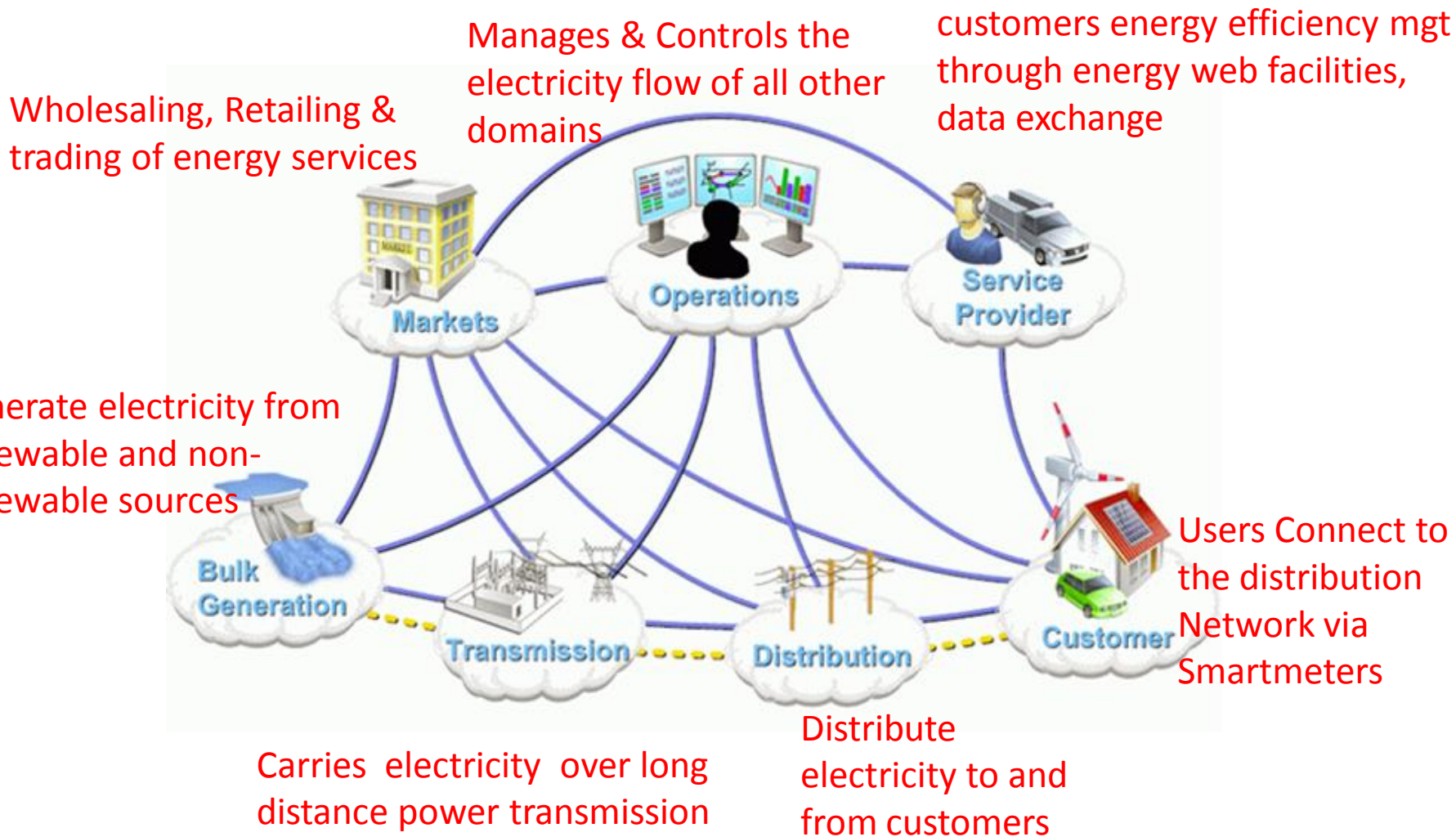
# PANEL SESSION ON SMARTGRIG

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# Participant Example in the Future Smart Grid context



Conceptual Model derived from (NIST, 2010), Secure comm — , Electrical Interface - - -

# Do we need broadband PLC in the network? Where?

Communication Channel			
	Glass fibre Broadband	Copper cable Broadband	DLC/PLC
<b>Markets</b> (Wholesale, Retail, Trading of energy services)	*	*	
<b>Operations</b> (Electricity flow Mgt to other domains )	*	*	*
<b>Service Providers</b> (data exchange , energy efficiency management through web porta)	*	*	*
<b>Generators (renewable, Nuclear, thermal, e.t.c.)</b>	*	*	
<b>Transmission Grids ( High Voltage, long distance)</b>	*	*	*
<b>Distribution grids (Low Voltage, Short distance)</b>		*	*
<b>Customers(End users with smart meters. Can generate!)</b>			*

# What are the (communications) requirements for grid control and AMR ?

	bandwidth (kbit/s)	traffic type	Max. Latency (s)	Max Jitter (ms)	BER	Network Recovery	Functional Unit	Concentration	Main use
<b>AMR</b>	<b>5.3 (1)</b>	<b>Periodic</b>	<b>0.5</b>	<b>NA</b>	<b>NA</b>	<b>1...2 hrs</b>	<b>per concentrator</b>	<b>300</b>	<b>LV</b>
<b>SCADA (Supervisory Control and Data Acquisition)</b>	1,8-9,6	Random	0.5	NA	1E-06 - 1E-14 (2)	1s	per concentrator	20	MV
<b>Operational Telephony</b>	8	Random	0.5	30	1.00E-03	15s	per call		MV
<b>Video surveillance</b>	<b>15-128</b>	<b>Random</b>	<b>1</b>	<b>NA</b>	<b>1.00E-04</b>	<b>NA</b>	<b>per camera</b>		<b>MV</b>
<b>Load Management , DSM,DSI</b>		Periodic	1	NA	NA	1s			MV,LV
<b>Software download / upgrade firmware</b>	32	Random	NA	NA	NA	NA	per concentrator	300	MV,LV
<b>street lighting dimming &amp; traffic control &amp; maintenance</b>	0.025	Random	300	NA		NA	group (32)	4	MV,LV

- |   |  |
|---|--|
| (1) 15 minutes interval                     |  |
| (2) Residual error rate according IEC 60870 |  |

# What are the (communications) requirements for AMR?

*AMR is a non time critical application:*

All meters are read every 15 mins =>

$$4(\mathbf{1hr/15mins}) * 24hr = 96 \text{ data packages/meter/day}$$

Net Data Volume per meter is 2KBytes every 15 mins =>

$$(2 * 8 * 4) / (60 * 60) = 17.77 \text{ bits/s/meter}$$

For 300 Meters per transformer => The Data Rate is:

$$17.77 * 300 = 5333.33 \text{ bits or } \mathbf{5.3Kbits/s}$$

