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D 2.3

AMENDMENT

IDENTIFICATION OF RESEARCH NEEDS FROM BOTTOM-UP APPROACH

KNOWLEDGE GAPS

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Document History

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0.1	05.08.2010	Initial draft – Protocol section
0.2	09.08.2010	Initial draft – PLC section
1.0	10.12.2010	Final document

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GLOSSARY AND ACRONYMS

BPSK	Binary Phase Shift Keying
DBPSK	Differential Binary Phase Shift Keying
DLMS	Device Language Message Specification
DQPSK	Differential Quadrature Phase Shift Keying
MI	Meter Interface
MUMI	Multi-Utility-Meter Interface
NPL	Narrowband Power Line
OFDM	Orthogonal Frequency Division Multiplex
OM-CR	Open MeterCommunication requirement
OM-GR	Open Meter General Requirement
OM-ER	Open Meter Economic Requirement
OM-FR	Open Meter Field Components Functional Requirement
OM-SR	Open Meter System Requirement
OM-TR	Open Meter Field Components Technical Requirement
S-FSK	Spread Frequency Shift Keying



1 PURPOSE

The purpose of this document is to provide a gap analysis of the additional technologies, “Meters and More” and “PLC G3”. This analysis is based on OPEN meter amendment to deliverable D2.2.

In this document, only interfaces assessed in D2.2 for the additional technologies are taken into account. It is worth underlining that new solutions might also be taken into consideration during the project timeframe, as long as these new developments are open and public and they do not interfere in the objectives of the project.

According to D2.3 v1.0, there will be no gap analysis regarding CI4 and MI5 interfaces.

Note: The SI3 interface is outside the Scope of the project.

2 AMENDMENTS TO THE CORE DOCUMENT

2.1 Amendment to chapter 3 Executive Summary

page	Chapter/ paragraph	action	Amendment								
11	3	Add	Add the following sentence before Table 3-1: According with the assessment done in D2.2, Meters and More technology and protocol offers suitable solutions for interfaces MI1-CI1, MI3 and CI2-SI1, therefore a gaps analysis has been done in this document for all these interfaces.								
11	3	Replace	Replace Table 3-1 with the following table: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Interface</th> <th>Selected Technology Type</th> <th>Selected Candidate Technologies</th> <th>Selected Data models and upper layer protocols</th> </tr> </thead> <tbody> <tr> <td>MI1 – CI1</td> <td>PLC</td> <td>PRIME IEC 61334-5-1 METERS AND MORE</td> <td>DLMS SML METERS AND MORE</td> </tr> </tbody> </table>	Interface	Selected Technology Type	Selected Candidate Technologies	Selected Data models and upper layer protocols	MI1 – CI1	PLC	PRIME IEC 61334-5-1 METERS AND MORE	DLMS SML METERS AND MORE
Interface	Selected Technology Type	Selected Candidate Technologies	Selected Data models and upper layer protocols								
MI1 – CI1	PLC	PRIME IEC 61334-5-1 METERS AND MORE	DLMS SML METERS AND MORE								



page	Chapter/ paragraph	action	Amendment			
					G3	
			CI2 – SI1	Wireless	UMTS GPRS	DLMS SML METERS AND MORE
			MI2 – SI2	Wireless	UMTS GPRS	DLMS SML
			MI3, CI3 and MUMI2	Wireless Optical Interface	IEEE802.15.4-2006 IEEE802.11-2007 METERS AND MORE	DLMS SML METERS AND MORE
			MUMI1 - MI4	Wireless	IEEE802.15.4-2006 IEEE802.11-2007 Wireless M-Bus	DLMS SML Wireless M-Bus
			CI4	Wireless	Zigbee Wifi	DLMS SML IEC 61850
			MI5	Wireless	Bluetooth (IEEE802.15.1-2002) Zigbee	DLMS (*) SML ZigBee SEP

Table 3-1: Overview of selected technologies and protocols for all relevant interfaces.



page	Chapter/ paragraph	action	Amendment
12	3	Add	<p>Add following note:</p> <p>Note 4: (*) MI5 in the original document was still considered in the scope of the OPEN meter project. There are additional technologies that are currently available for MI5 interface but have not been included in the table. Example of those technologies are Meters & More, FSK, etc...</p>

Table 2-1 Amendments to D2.3 chapter 3 – Executive Summary

2.2 Amendment to chapter 4 Knowledge Gaps – PLC Technologies

page	Chapter/ paragraph	action	Amendment
18	4.2.1.3	Delete	<p>Delete paragraph “4.2.1.3 Manageability” from PRIME section.</p> <p>General content moved to new par. §4.1.4.</p>
20	4.2.1.5	Delete	<p>Delete paragraph “4.2.1.5 Power consumption” from PRIME section.</p> <p>General content moved to new par. § 4.1.4.</p>
20	4.2.1.6	Delete	<p>Delete paragraph “4.2.1.6 Functionality” from PRIME section.</p> <p>General content moved to new par. §4.1.4.</p>
20	4.2	Add	<p>Add a new paragraph:</p> <p>4.1.4 Gaps to be evaluated under real-world conditions</p> <p><i>4.1.4.1 Feasibility of in-system communication performance tests</i></p> <p>Performing in-system communication performance tests as described in OM-FR143 (“The electricity meter shall provide functionality to respond to a communication test initiated by the central system directly or indirectly through the concentrator”) may affect the overall network performance.</p> <p><u>Gap:</u></p>



page	Chapter/ paragraph	action	Amendment
			<p>The effects of single services and operations on network performance are unknown for not yet deployed technologies.</p> <p><u>Research and development need:</u></p> <p>It should be verified if such tests are feasible to be conducted during normal system operation.</p> <p><i>4.1.4.2 Determine power consumption for each of the use cases</i></p> <p>Power consumption of low frequency NPL communication devices may be high due to low access impedance.</p> <p><u>Gap:</u></p> <p>The power consumption of not yet deployed technologies under real-world conditions is unknown.</p> <p><u>Research need:</u></p> <p>It is necessary to determine the power consumption for PLC equipment under real-world transmission channel conditions covering all relevant use cases appropriately.</p> <p><i>4.1.4.3 Define a set of functional requirements that can be implemented in reality</i></p> <p>The feasibility of implementing all functional requirements may be questionable since some of the functional requirements may cause significant network load.</p> <p>In case that not all functional requirements can be implemented, due to network performance issues, the number of functional requirements has to be reduced and / or functional requirements have to be adapted.</p> <p><u>Gap:</u></p> <p>It is unknown whether all functional requirements specified in D1.1 can be put into practice under real-world conditions for each PLC technology. In addition, at this moment it is not possible to foresee all future applications (OM-ER5).</p> <p><u>Research need:</u></p> <p>It has to be verified that the total set of functional</p>



page	Chapter/ paragraph	action	Amendment
			<p>requirements can be implemented under real-world communication scenarios.</p> <p>Experiences from currently deployed technologies (for example Meters and More in Italy) allow affirming that real-world conditions are very diverse. During experimental activity in following phases of this Project, it is advisable to test requirements in a well-defined configuration of meters and concentrators, adding one function at a time.</p> <p>4.1.4.3 General issues</p> <p>In the following, specific issues arisen in D2.2 assessment are discussed:</p> <ul style="list-style-type: none"> • OM-CR5 (support of multicast and broadcast transmission mode): in general, broadcasting of authenticated messages is not supported by this kind of infrastructure. • Coexistence between S-FSK and BPSK may be guaranteed by frequency separation.
22	4.2	Add	<p>Add a new paragraph:</p> <p>4.2.3 Gap Analysis for PLC G3</p> <p>4.2.3.1 Standardization</p> <p><i>4.2.3.1.1 Test modes and conditions</i></p> <p><u>Gap:</u></p> <p>The present G3 standard does not specify test modes and conditions.</p> <p><u>Research and development need:</u></p> <p>Specifying appropriate test procedures to guarantee interoperability and essential system performance.</p> <p>4.2.3.2 Transmission Performance</p> <p><i>4.2.3.2.1 Data throughput in real-world communication scenarios</i></p>



page	Chapter/ paragraph	action	Amendment
			<p><u>Gap:</u></p> <p>No knowledge is available about the data throughput of G3 networks with a lifelike number of nodes in a real-world scenario.</p> <p><u>Research need:</u></p> <p>In order to determine the actual performance of G3 appropriate simulation or measurement results are needed.</p> <p><i>4.2.3.2.2 Verification of adaptive modulation scheme</i></p> <p><u>Gap:</u></p> <p>It is not known whether one of the communication modes (modulation schemes) is superior and thus should be preferred while being automatically adapted.</p> <p><u>Research need:</u></p> <p>It is necessary to verify the feasibility and benefits of using different automatically selected modulation schemes (DBPSK and DQPSK).</p> <p><i>4.2.3.2.3 Mesh Network</i></p> <p><u>Gap:</u></p> <p>The mesh network approach is designed for wireless networks. No information is available how reliable this technology works taking into account the specific properties of the power line channel. Especially the effects of the dynamic part of the technology may cause significant performance degradation.</p> <p><u>Research need:</u></p> <p>A verification of the networking approach under real-world conditions is needed.</p>
22	4.2	Add	<p>Add a new paragraph:</p> <p>4.2.4 Gap Analysis for Meters and More</p> <p>4.2.4.1 Standardization</p> <p><i>4.2.4.1.2 Test modes and conditions</i></p>



page	Chapter/ paragraph	action	Amendment
			<p><u>Gap:</u></p> <p>The present Meters and More specification does not specify standardized test modes.</p> <p><u>Research and development need:</u></p> <p>Specifying appropriate test procedures to guarantee interoperability and essential system performance.</p> <p><i>4.2.4.2.2 Multi utility metering</i></p> <p><u>Gap:</u></p> <p>At present, a specification regarding how to support multi-metering is lacking.</p> <p><u>Development Need:</u></p> <p>This extension only requires the implementation of a M2M gateway external device (for further details please refer to following documents: "SMCG Final Report" and "SMCG First Draft Communication Report") and the definition of corresponding data tables without any modifications to the lower and upper communication layers or protocols. The Meters and More Association is releasing this extension.</p> <p>4.2.4.2 General comments</p> <p>Regarding "OM-CR9": all meters have the ability to work as repeater, but the concentrator assigns this role because it determines routing paths to reach meters.</p>
<p>NOTE: Figure captions, table captions and the table of content have to be updated in order to take into account the previously described amendments</p>			

Table 2-2 Amendments to D2.3 chapter 4 - PLC technologies

2.3 Amendment to chapter 6 Knowledge Gaps – Data Models and “Higher Layer” Protocols

page	Chapter/ paragraph	action	Amendment
47	6	Add	Add a new paragraph:



page	Chapter/ paragraph	action	Amendment
			<p>6.4 PLC G3</p> <p>Upper layers of “PLC G3” are provided by DLMS/COSEM, then paragraph §6.1 applies.</p>
47	6	Add	<p>Add a new paragraph:</p> <p>6.4 Meters and More</p> <p>Gap analysis activity has involved MI1-CI1, CI2-SI1 and MI3 interfaces. Below we report some general gaps and other ones that are specific of some interfaces.</p> <p><u>MI3 interface</u></p> <p>Optional requirement OM-FR75 “The electricity meter should provide functionality to set location information in the meter after the meter is physically installed but before the meter is deployed” is not fully satisfied.</p> <p>Because this feature could be important to detect faults or identify routing paths, it will be considered for future releases.</p> <p><u>MUMI1-MI4 interface</u></p> <p>At present, a specification regarding how to support multi metering is lacking (see par.§4.2 for details). The Meters and More Association will include this feature in next releases of the specification.</p> <p><u>Optional Requirements</u></p> <p>The issues listed below arise from optional requirements which are not compulsory.</p> <ul style="list-style-type: none"> • Prepayment is not supported in the current release, because most Countries didn’t require it. It is included in the Italian version only, and it will be included in the next published release. • Retrieving of stored information is supported, but in the current specification the total handling time is not configurable.
<p>NOTE: Figure captions, table captions and the table of content have to be updated in order to take into account the previously described amendments</p>			



Table 2-3 Amendments to D2.3 chapter 6 – Data models and “higher layers” protocols

3 COPYRIGHT

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