



From global measurements to local management

D 5.5: Public record of Industrial workshop

Date: 5th February 2015

Version: 1

Dissemination level: Public (PU)

Project co-funded by Leone Partners and by the European Commission in the 7th Framework Programme



ABSTRACT

The Leone project organised an industrial workshop, which was targeted at speeding up the move from standards for large-scale measurements to their implementation and adoption.

We organised three co-located events on Monday 15th and Tuesday 16th September 2014 in Dublin, in cooperation with the Broadband Forum and the IETF LMAP working group:

- A workshop on “Large-scale measurements – from standards to implementation and adoption”
- An interim meeting of the IETF’s LMAP working group
- A meeting of the Broadband Forum’s End to End Architecture working group, in order to resolve the straw ballot comments on WT-304



ABOUT THE PROJECT

Project Coordinator: Philip Eardley, BT

Technical Manager: Sam Crawford, SamKnows

Start date of project: November 1st 2012

Duration: 30 months

Acknowledgement: Leone is a Collaborative project under FP7 ICT-2011.1.1 Future Networks. The research leading to these results has received funding from the European Union Seventh Framework Programme [FP7/2007-2013] under grant agreement n° 317647.

ABOUT THE DOCUMENT

Editor: Philip Eardley (BT)

Author(s): Philip Eardley

Due date of deliverable: 30th April 2015

Actual submission date: 5th February 2015

Copyright notice

© 2012 - 2015 Leone Consortium

Disclaimer

This document contains material, which is the copyright of certain Leone consortium parties, and may not be reproduced or copied without permission.

The commercial use of any information contained in this document may require a license from the proprietor of that information.

Neither the Leone consortium as a whole, nor a certain party of the Leone consortium, warrant that the information contained in this document is capable of use, or that use of the information is free from risk, and accept no liability for loss or damage suffered by any person using this information.



EXECUTIVE SUMMARY

The Leone project organised three co-located events on Monday 15th and Tuesday 16th September 2014 in Dublin, in cooperation with the Broadband Forum and the IETF LMAP working group:

- A workshop on “Large-scale measurements – from standards to implementation and adoption”
- An interim meeting of the IETF’s LMAP working group
- A meeting of the Broadband Forum’s End to End Architecture working group, in order to resolve the straw ballot comments on WT-304.

Measuring broadband performance on a large scale is important for network diagnostics by providers and users, as well as for public policy. Today there are several independent, vendor-specific and small- or modest- scale systems. There has also been a lot of work recently at the IETF and Broadband Forum on the standardisation of large-scale measurements. It was therefore very timely for a workshop to consider how to advance large-scale measurements from standards to real implementations.

We took advantage of the attendance of all the key vendors and operators – and the large majority of the key individuals – at the Broadband Forum meeting in Dublin in September 2014 to organise three events.

The first part, organised specifically by the Leone project, was a special workshop focussed on the move from standards for large-scale measurements to their implementation and adoption. There were two main topics:

- Implementation and adoption of metrics in Broadband Forum devices, such as home gateways
- Implementation and adoption of the information model in Broadband Forum devices

The second part was a special interim meeting of the IETF LMAP working group. We initiated this meeting and led several of the agenda items.

The third part was the regular meeting of the Broadband Forum’s End to End Architecture working group (where the BBF’s activity on this topic is done and Leone partners contribute). In addition, the BBF kindly opened this meeting to non-members who had come to the other events. Hence we could enable the key academic people to also contribute to the set of meetings.



TABLE OF CONTENTS

EXECUTIVE SUMMARY	4
ABBREVIATIONS	6
1 INTRODUCTION	7
2 PARTICIPANTS	8
3 WORKSHOP ON LARGE-SCALE MEASUREMENTS – FROM STANDARDS TO IMPLEMENTATION AND ADOPTION	9
3.1 Topic 1: Implementation and adoption of metrics in BBF devices	9
3.2 Topic 2: Implementation and adoption of the information model in BBF devices.	10
4 INTERIM MEETING OF IETF LMAP WORKING GROUP.....	12
5 BROADBAND FORUM MEETING ON WT-304	14



ABBREVIATIONS

ACS	Auto Configuration Server
BBF	Broadband Forum
CPE	Customer Premises Equipment
CWMP	CPE WAN Management Protocol (TR-069)
HTTP	Hypertext Transfer Protocol
IANA	Internet Assigned Numbers Authority
ID	Identity
IETF	Internet Engineering Task Force
IPDR	IP Detailed Record
LMAP	Large-scale Measurement Platform
REST	Representational state transfer
RFC	Request For Comments
SD	Study Document
TR	Technical Report
WG	Working Group
WT	Working Text



1 INTRODUCTION

Measuring broadband performance on a large scale is important for network diagnostics by providers and users, as well as for public policy. Today there are several independent, vendor-specific and small- or modest- scale systems.

The objective of the workshop was to help advance large-scale measurements from standards to real implementations. There were three co-located events, each of a half-day's duration:

- EVENT 1: Workshop on Large-scale measurements – from standards to implementation and adoption
- EVENT 2: Interim meeting of IETF LMAP working group
- EVENT 3: meeting of the Broadband Forum's End to End Architecture working group, in order to resolve the straw ballot comments on WT-304

The Broadband Forum kindly agreed to co-locate the three events during one of their regular quarterly meetings. They also agreed that non-members could attend (the BBF is a membership organisation for vendors and operators). In combination the three events together made it worthwhile for several experts to travel who would not have come for just one event. Sponsorship by the Leone project covered the additional meeting room required.

Further details are at <http://workshop.leone-project.eu/>

2 PARTICIPANTS

There were 20-30 people at each of the various events. Formal list of attendees were not taken, however the key players were present such as:

Al Morton, AT&T
Arne Oslebo, Uninet
Barbara Stark, AT&T
Benoit Claise, Cisco (IETF Area Director for LMAP)
Charles Cook, Century Link (BBF WT-304 Editor)
Dave Sinicrope, Ericsson (Liaison manager for IETF /BBF)
Dave Thorne, BT Research (BBF end to end architecture WG Chair)
Frederic Klamm, Orange
George Dobrowski, Huawei
Greg Mirsky, Ericsson
Jason Weil (IETF LMAP WG Chair)
Juergen Schoenwalder, Jacobs University Bremen
Ken Ko, Adtran (BBF WT-304 Editor)
Ken Kerpez, ASSIA, Inc.
Lincoln Lavoie, University of New Hampshire InterOperability Lab
Marcelo Bagnulo, UC3M
Philip Eardley, BT Research
Stephen Farrell, Trinity College Dublin (IETF Area Director for Security)
Tim Carey, Alcatel Lucent
Trevor Burbridge, BT Research
Vaibhav Baipai, Jacobs University Bremen



3 WORKSHOP ON LARGE-SCALE MEASUREMENTS – FROM STANDARDS TO IMPLEMENTATION AND ADOPTION

The workshop covered two topics:

- Topic 1: Implementation and adoption of metrics in BBF devices
- Topic 2: Implementation and adoption of the information model in BBF devices.

The discussions were led by people from BT, AT&T, Alcatel Lucent and University of New Hampshire InterOperability Lab. In detail the topics included:

- The IETF is defining a process for registering metrics (and their methods of measurement) – should the BBF use this process for its own metrics?
- How the IETF's information model could be implemented using BBF protocols (TR-069, TR-157, T-181, TR-232, SD-323)
- How to avoid cross traffic (including the test traffic) affecting a user's experience – we discussed various approaches to this important issue
- Early planning for a plugfest /interop event – the suggestion is to start defining interop requirements and consider setting up a new BBF project to do this

Further information is at <http://workshop.leone-project.eu/events-info/>

Presentations are at <http://leone-project.eu/drupal/Presentations>

3.1 Topic 1: Implementation and adoption of metrics in BBF devices

The IPPM WG at the IETF has defined many IP-related metrics and is currently defining additional metrics, measurement protocol extensions and a process for registering metrics. How should this work be implemented in a BBF device?

During the first part of the workshop we spent some time introducing BBF members to the overall Registry concept and an overview of the IETF's IPPM working group, which has produced several RFCs and documents. We mainly did this by a walk-through of "the life of a metric", looking at how it would be defined in an RFC, what additional information would be required by the registry (roles, parameters, etc.), how the review and approval process would work within the IETF, and how the measurement tasks themselves are derived from a registry entry.

We then discussed what the BBF's role should be, in the context of metrics and related topics. For example, should the BBF have its own registry namespace (and registration process), or are their metrics registered through IANA (the IETF's registration body).



Some interesting points and conclusions from the discussions were as follows.

- A registry entry tightly defines a test, so that tests give comparable results. In order for comparability, the registry may need to say what values are acceptable for a parameter. Note that if the same metric is measured in different ways, this corresponds to two entries (it was felt this needs clarifying in the internet draft).
- The registry is primarily for human readers, rather than automatic reading by machines. An idea was raised that it may be better for registry IDs to be sparsely allocated, so entries for similar metrics can be clustered.
- The expert review approval of new entries in the registry ensures that it is implementable.
- Some metrics will have more than one role (eg sender and receiver), and the associated parameters may well be different roles. This is handled by the different roles using different parts of the registry (some fields may be empty for some roles).
- We concluded that it is preferable for the BBF to register its metrics through IANA rather than use its own process and registry. However, there are some political considerations that need checking.
- An open issue is whether the IETF /IANA's expert review process could cope with the volume of BBF-related requests. For example, the TR-143 spec typically gets revised every year, and each rev would create a new set of registry entries. We concluded that it was best to find out in practice – in any case, whatever the formal approach there needs to be a review process and several of the experts are likely to be the same.
- The BBF could define a set of metrics (a 'profile') to be implemented by a particular sort of device (such as a home gateway). An obvious place to do this is the BBF's residential gateway group.
- At present there is no interest in the BBF defining specific statistics derived from measurement results or defining characterization plans (how many probes testing on what schedule). However, people were open to such work, if someone wanted to drive it.

3.2 Topic 2: Implementation and adoption of the information model in BBF devices.

The LMAP WG at the IETF is defining an (abstract) information model for broadband measurements. How should this work be implemented in BBF devices?

During this part of the workshop we introduced the overall information and data model concepts that the IETF LMAP WG has developed, and also gave an overview of the BBF's TR-181 based work. We then discussed how the BBF could go about implementing the Information Model, what additional requirements the BBF has and if that implies any extensions to the information model. We also had some early discussion and pre-planning for an interoperability event ('plugfest').



Some interesting points and conclusions from the discussion were as follows.

- We discussed how to fit LMAP into the BBF standards, in particular when the CPE (such as home gateway) is used as a measurement agent. The basic answer is that there is a good fit. The BBF's Broadband Home working group has been looking at how two of their documents would need amending: TR-181 "Device Data Model for TR-069" (to include additional LMAP attributes) and TR-157 "Component Objects for CWMP". The group is also studying (in SD-323, "BBHome Work Items Related to WT-304") different deployment options: the ACS using CWMP for bootstrapping, with separate control & report protocols; or using CWMP for control as well as bootstrapping. The BBF currently considers that TR-232 is the most likely choice for reporting (it's an IPDR-based mechanism for bulk data collection), however there is also a contribution about the use of HTTP.
- The IETF has not yet defined a protocol that implements the information /data model (or perhaps different choice for control and reporting). However, several proposals have been made. So far these are all HTTP-based. As part of the IETF protocol discussion, we need to continue to consider how this fits into the BBF work. It was agreed during the workshop that the BBF doesn't want to do unnecessary work.
- We briefly discussed the possibility of CPE being used as a proxy for a measurement agent on a laptop say. Further work is needed.
- We clarified that the protocols which a device uses are capabilities of the measurement agent.
- We discussed the complex issue of cross-traffic. Cross-traffic is any traffic not created specifically for the purposes of measurement. So the output of a cross-traffic measurement task can be used to decide whether another measurement task can go ahead. Typically this is to stop the test traffic generated by an 'active' measurement interfering with the end-user's application traffic; it may also be useful in the case of a 'passive' measurement to check that the right end-user traffic is present and therefore the measurement is possible. So a cross-traffic measurement task would have inputs such as duration and the interface to measure, and the output could be a packet count for instance. It is non-trivial to define, as applications may generate traffic intermittently (eg web browsing) – and hence also it may also need to be an on-going task, so that an active test can be abandoned if user traffic suddenly starts.
- We had a very interesting, early discussion about an interoperability event (often called a plugfest). Interoperability is a central objective of both the IETF and BBF. Essentially it needs a "test plan" – which can be developed in parallel with the protocol spec. Interop planning can be done in stages – for example to develop cases at high level in the near future (roughly at the information model level), and later add more detail about protocol specifics such as authentication. Developing the interop plan would require a new BBF work item.



4 INTERIM MEETING OF IETF LMAP WORKING GROUP

Details of the meeting are on-line:

- Agenda <http://www.ietf.org/proceedings/interim/2014/09/15/lmap/agenda/agenda-interim-2014-lmap-1>
- Minutes <http://www.ietf.org/proceedings/interim/2014/09/15/lmap/minutes/minutes-interim-2014-lmap-1>
- Proceedings <http://www.ietf.org/proceedings/interim/2014/09/15/lmap/proceedings.html>
(including slides)

The main topic was to resolve open issues on the Information Model, which is the protocol-neutral definition of the semantics of the various messages and events in a large-scale measurement system. It ensures that the actual protocols will perform the job required, and that where it is appropriate for different types of device to use different protocols, then they perform the same job. Most of the discussion was about what is defined in the schedule versus what in task and what in the channel. We resolved many issues, whilst others were the subject of on-going discussion. At the time of writing, all the issues have been resolved.

The major items discussed were:

- Discussion about cross-traffic (see the workshop Topic 2 above)
- The output of one task may be the input of another. The question is how to describe this. For example, a typical implementation might use a queue. The agreement is to not to give implementation details.
- A task's parameters are set in the task configuration. The question is whether the settings can be over-written by a schedule. The agreement is: yes.
- A report should optionally be able to include details of the task configuration. This can be useful for example to check that the measurements are operating as expected, however it should be optional since the amount of information can be quite large.
- It may be useful to define a hierarchy of error codes.

The other major topic was protocols. We reached consensus about many of the ways that the IETF protocol will operate.

- A new protocol proposal was presented. It uses RESTCONF (the subject of on-going IETF work), as well as a reminder of the existing two. All three proposals build on HTTP, so should be able to converge.



-
- We discussed what requirements the LMAP framework sets on protocols, on areas such as: security and privacy; reliability (the measurement agent and controller need to be sure that they're working to the same instruction); issues raised by the measurement agent device having multiple interfaces; and issues associated with re-start after a failure or factory re-set.

In addition, the opportunity was taken for some face-to-face discussion with the IETF Area Director about the use cases and framework documents, since they have reached the AD review stage.



5 BROADBAND FORUM MEETING ON WT-304

WT-304 is the Broadband Forum's work about Broadband Access Service Attributes and Performance Metrics. The current work is roughly equivalent to the architecture (framework) document in the IETF LMAP WG. It takes place in the BBF's End to End Architecture working group.

One stage of a BBF document is called the 'straw ballot'. During the 'straw ballot' phase members of the working group review the draft document in detail. The group then undertakes a line-by-line review of the combined comments and agrees how to resolve them all. This meeting was one of several to resolve all the comments. The main topic discussed on this particular occasion was how to improve the introduction, so that the reader understands how the various pieces work together: tasks, channels, reports, capabilities, registry and so on.

The current version of the document is a draft and so is not publicly available, since the BBF is a membership organisation. The final version will be published.