Large MeAsurement Platform Protocol

draft-bagnulo-lmap-http-03

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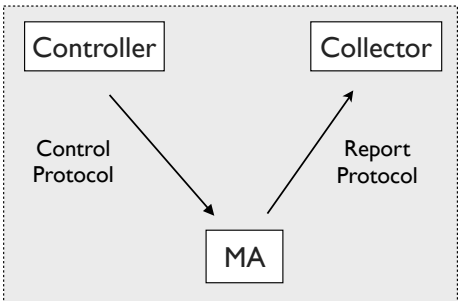
I-D in 1-slide

- HTTP as the LMAP control and report protocol [1].
- TLS with X.509 certificates to secure the transport.
- Ideally, mutual authentication should be used.
- Server-side authentication is a MUST.
- A REST architecture on top of HTTP.
- LMAP Information Model (IM) [2] encoded in JSON [3].



A high-level reference architecture of the Large-Scale Measurement of Broadband Performance (LMAP) Framework [1].

Why an HTTP-based approach?

- HTTP is widely deployed. HTTP clients already available on target LMAP devices.
  - + OpenWrt-based Customer Premises Equipment (CPE) come deployed with `curl`[1].
  - + SamKnows and RIPE Atlas probes also run OpenWrt.
- HTTP is middlebox friendly. HTTP can traverse firewalls and NAT devices.
- HTTP has a large open-source ecosystem around it.
  Plethora of tools and development expertise available already.

[1] http://curl.haxx.se

Naming Considerations

- Controllers have FQDN (or static public IP endpoints).
- Collectors have FQDN (or static public IP endpoints).
- Measurement Agent (MA) likely behind NAT; use a UUID [4].

Implementation Status

- SQL schemas to create a 1-1 map of LMAP IM -02 objects [2] to `sqlite3` tables.
- Implementation generated JSON encoded examples [5] by querying `sqlite3` tables[2].
- Pre-configuration/Configuration to register and retrieve a UUID from a LMAP controller.
- Reporting of measurement results to a LMAP collector.

[2] Thanks to Vlad Victor Ungureanu (Jacobs University Bremen) for providing external support.

Open Issues

Open Issues

Which Data Modeling Language to use?

- JSON schemas
  - – JSON WG not working on JSON schemas[3].
  - – Individual I-D on JSON-schemas expired [6].

- YANG [7, 8]
  - \+ YANG data models can be reused. For instance, IF definitions [9] and data types [8] can be easily imported into LMAP YANG data models.
  - \+ Mature YANG validator and convertor tools available: `pyang`[4].
  - \+ Preliminary work done on LMAP YANG data models [10, 11].

[3] https://datatracker.ietf.org/wg/json/charter

[4] https://code.google.com/p/pyang

Open Issues

LMAP Control Protocol: Push vs Pull?

- LMAP Controller pushes to MA:
  - \+ No need to wait for MA to initiate communication.
  - \+ Immediate on-demand measurements becomes easy to implement.
  - \+ Measurement Suppression becomes easy to implement.
  - − MAs likely behind NAT; requires a call-home and client-server role reversal mechanism.
- MA pulls from LMAP Controller[5]:
  - \+ Circumvents NAT issues.

[5] The I-D currently assumes a pull-based design.

Open Issues

LMAP Control Protocol: GET vs POST

- MA pulls by sending a HTTP GET to LMAP Controller:

```
GET /.well-known/lmap/instructions/$UUID
HTTP/1.1
Host: controller.example.com
Accept: application/json
```

- MA pulls by sending a HTTP POST to LMAP Controller:

```
POST /.well-known/lmap/instructions
HTTP/1.1
Host: controller.example.com
Content-Type: application/lmap-maid+json
Accept: application/lmap-config+json
{"UUID" : "550e8400-e29b-11d4-a716-446655440000"}
```

Open Issues

LMAP Report Protocol: POST vs PUT

- MA pushes results by sending a HTTP PUT to LMAP Collector:
  - \+ PUT is idempotent.
  - – Requires an explicit naming scheme for the report resource.

- MA pushes results by sending a HTTP POST to LMAP Collector:
  - \+ URI scheme remains simple.
  - – POST needs server-side logic to make result reporting idempotent.

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