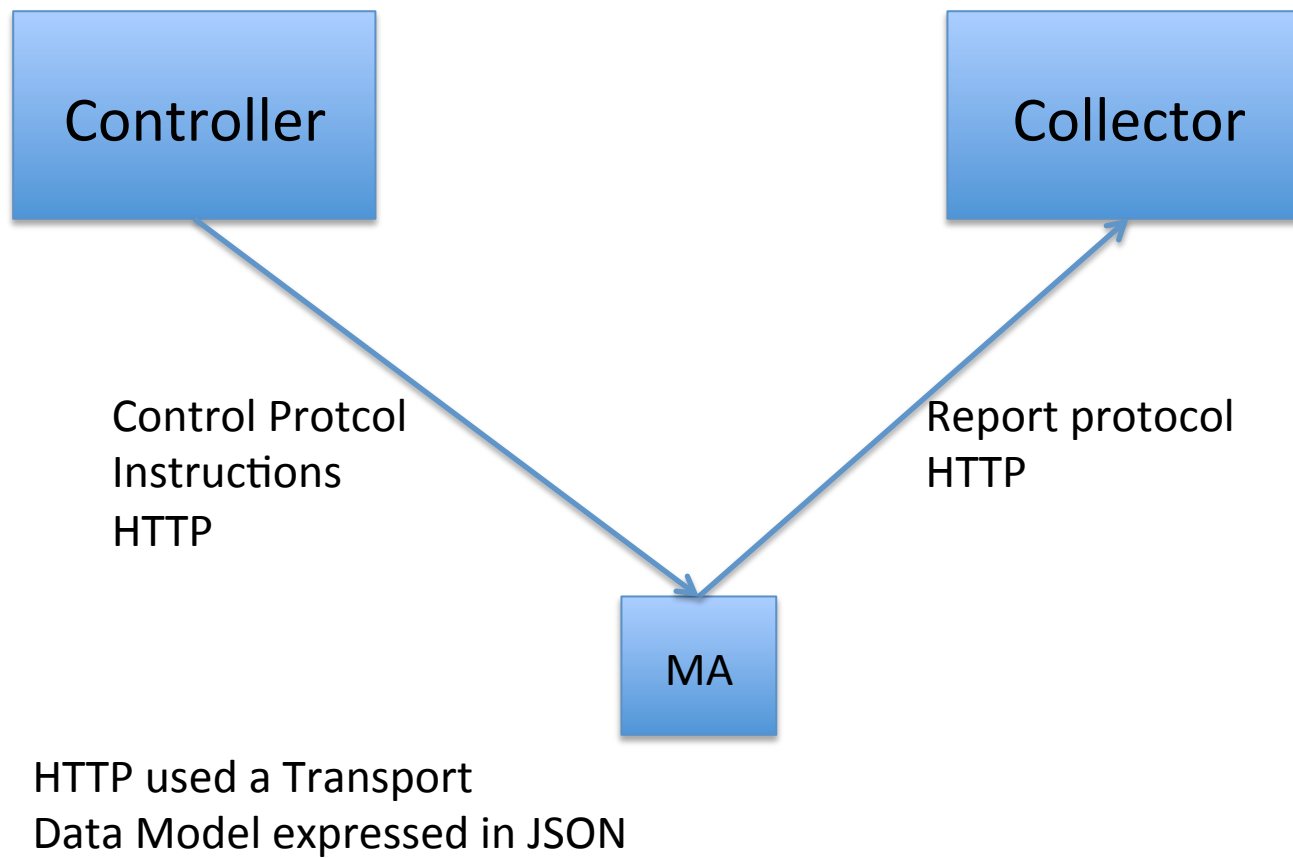# Large MeAsurement Platform Protocol based on HTTP

draft-bagnulo-lmap-http-00

M. Bagnulo, T. Burbridge, S. Crawford, J. Schoenwaelder, V. Bajpai

LMAP WG – IETF87

Big Picture

Controller

Collector

MA

Control Protcol
Instructions
HTTP

Report protocol
HTTP

HTTP used a Transport
Data Model expressed in JSON

Benefits

- HTTP exist already on all possible lmap devices (home routers, smart phones, pcs, …)
- Easily gets through firewalls, NATs and other middleboxes
- Lots of tools and lots educated people in HTTP, likely to reduce development time

Some Naming considerations

- Controllers have FQDN and/or stable IP address, so we use them as IDs
- Collectors have FQDN and/or stable IP address so we use them as IDs
- MAs cannot be assumed to have none of those. MAs likely behing NATs, so private and/or ephermeral IP address. We suggeste to use a UUID as ID for the MAs
  - UUID version 4 random or pseudo randomly generated
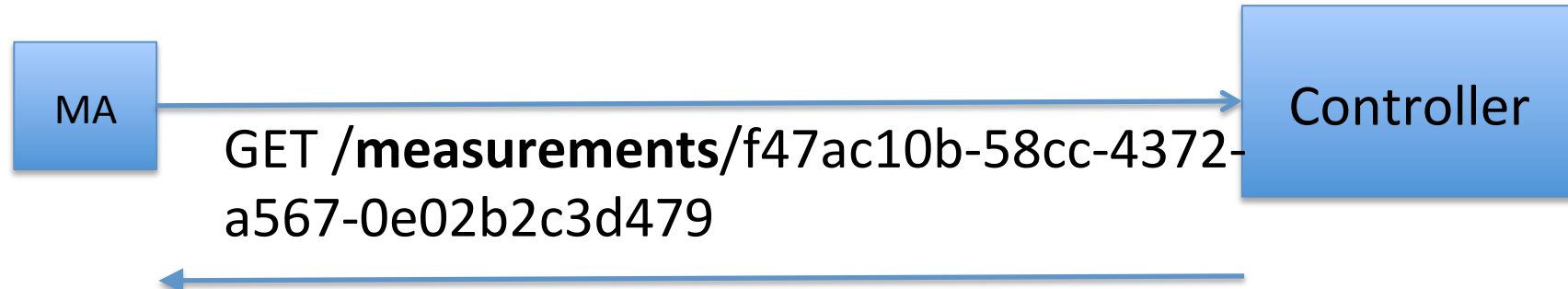
Simple example

- Simple scenario with these elements:
  - a Controller with FQDN controller.example.org,
  - a Collector with FQDN collector.example.org, and
  - a MA with UUID f47ac10b-58cc-4372-a567-0e02b2c3d479
- Test to be performed:
  - A UDP latency test, without cross-traffic, that reports the 99th percentile mean of a burst of packets sent following a Poisson distribution that lasts for 30 seconds and with rate 5 packets per second. The destination address is 192.0.2.1 and the destination and source port are 50000. We want to repeat this test for 7 days every hour. Report the results every hour.

Control Protocol: Retrieving Instructions

MA → Controller

GET /.well-known/lmap/ma-info/
f47ac10b-58cc-4372-a567-0e02b2c3d479

"**measurement-set**": "http://controller.example.org
/measurements/f47ac10b-58cc-4372-a567-0e02b2c3d479",
"**report-channel-set**": "http://controller.example.org
/channels/f47ac10b-58cc-4372-a567-0e02b2c3d479",
"**repeated-schedule-set**": "http://controller.example.org
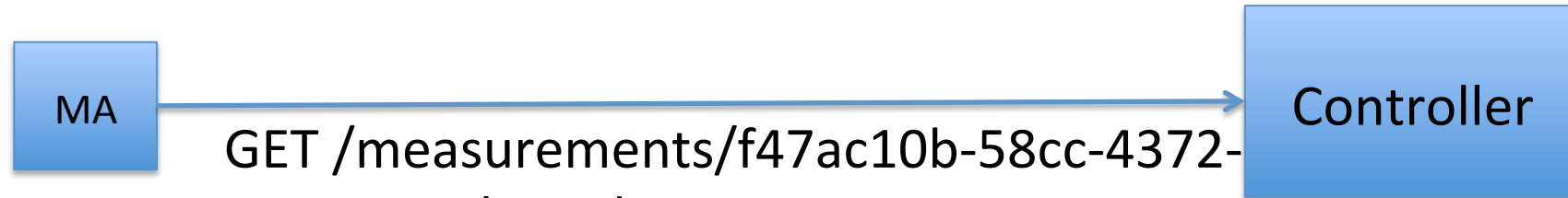/schedules/f47ac10b-58cc-4372-a567-0e02b2c3d479"
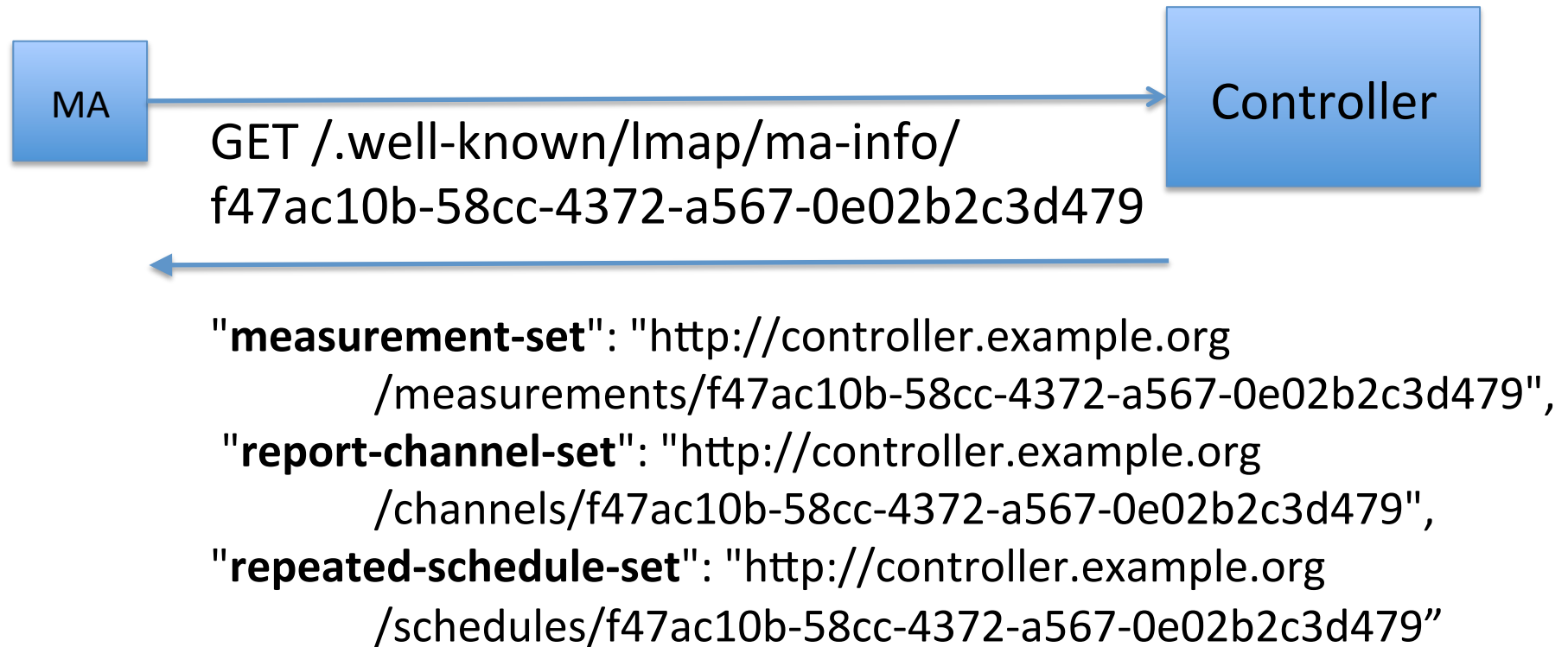
- The MA is preconfigured to contact the Controller periodically once it is deployed
- .well-known/lmap/ma-info is a well knownpath prefix as per RFC 5785

Control Protocol: Retrieving Instructions

MA → Controller

GET /**measurements**/f47ac10b-58cc-4372-a567-0e02b2c3d479

"tests": [{ "name": "latency",
        "description": "UDP round trip latency",
        "metric": "UDP_Latency",
        "options": [{ "environment": "No-cross-traffic",
                "Output-type": "Xth-percentile-mean",
                "X": "99",
                "Scheduling": "Poisson",
                "rate": "5",
                "duration": "30.000",
                "destination-ip": {"version": "4", "value": "192.0.2.1"},
            "destination-port": "50000",
            "source-port": "50000" }] }

Control Protocol: Retrieving Instructions

MA → Controller

GET /measurements/f47ac10b-58cc-4372-a567-0e02b2c3d479

```
"tests": [{ "name": "latency",
        "description": "UDP round trip latency",
        "metric": "UDP_Latency",
        "options": [{ "environment": "No-cross-traffic",
                "Output-type": "Xth-percentile-mean",
                "X": "99",
                "Scheduling": "Poisson",
                "rate": "5",
                "duration": "30.000",
                "destination-ip": {"version": "4", "value": "192.0.2.1"},
        "destination-port": "50000",
        "source-port": "50000" } ] }
```
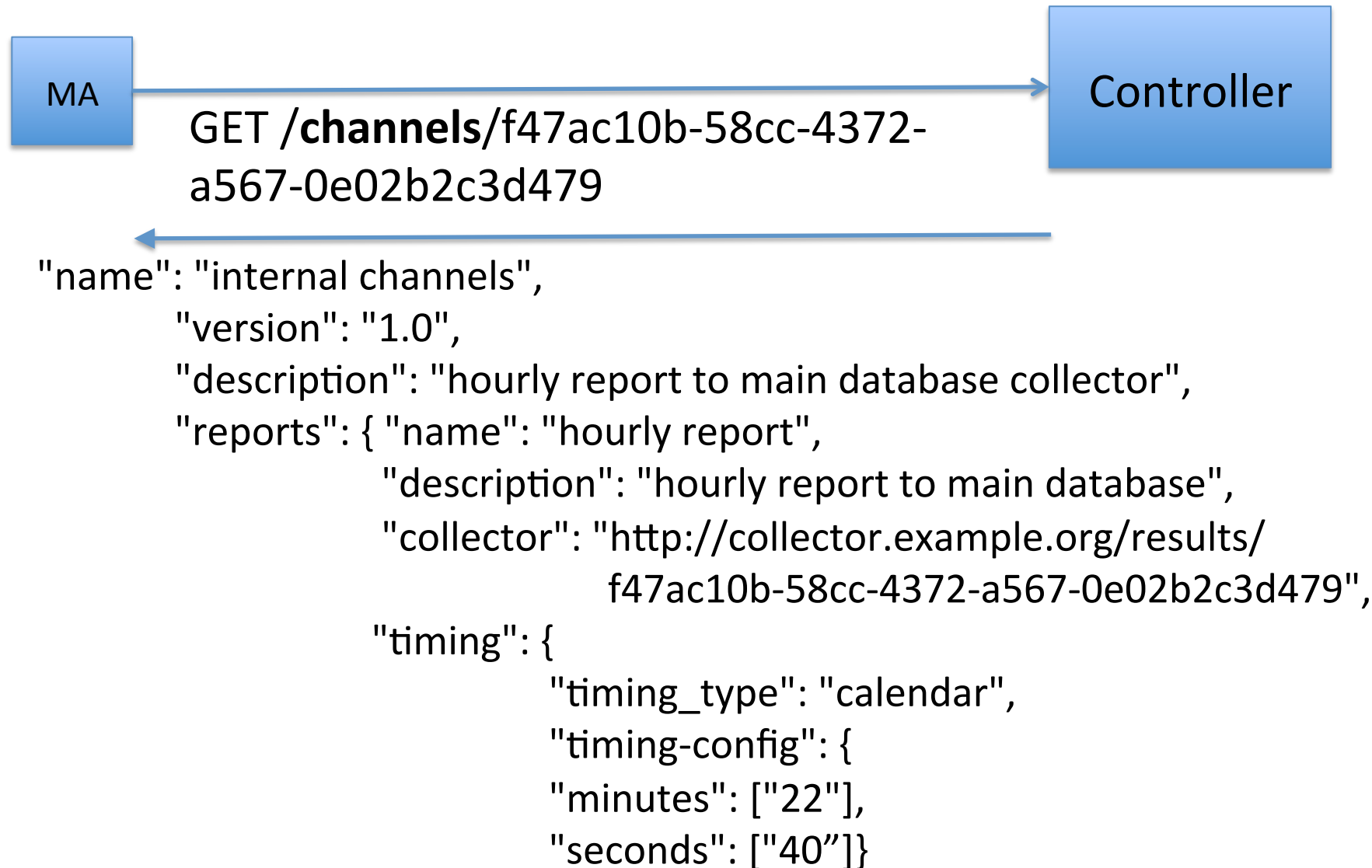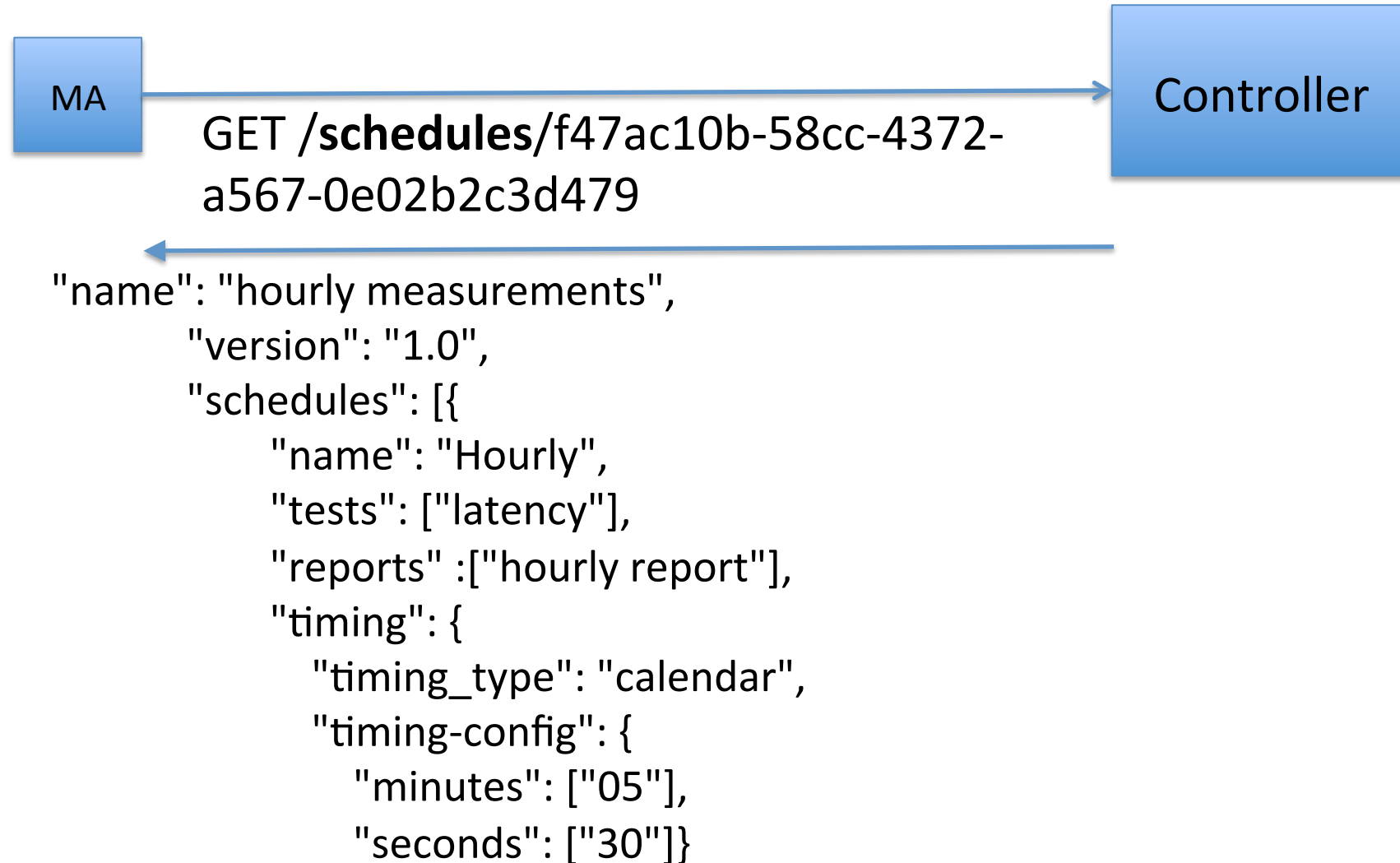
Values defined in metrci regsitry

Control Protocol: Retrieving Instructions

MA → Controller

GET /**channels**/f47ac10b-58cc-4372-a567-0e02b2c3d479

```
"name": "internal channels",
    "version": "1.0",
    "description": "hourly report to main database collector",
    "reports": { "name": "hourly report",
              "description": "hourly report to main database",
              "collector": "http://collector.example.org/results/
                          f47ac10b-58cc-4372-a567-0e02b2c3d479",
         "timing": {
                   "timing_type": "calendar",
                   "timing-config": {
                   "minutes": ["22"],
                   "seconds": ["40"]}
```

Control Protocol: Retrieving Instructions

MA → Controller

GET /**schedules**/f47ac10b-58cc-4372-a567-0e02b2c3d479

```
"name": "hourly measurements",
      "version": "1.0",
      "schedules": [{
            "name": "Hourly",
            "tests": ["latency"],
            "reports" :["hourly report"],
            "timing": {
                "timing_type": "calendar",
                "timing-config": {
                    "minutes": ["05"],
                    "seconds": ["30"]}
```

Control Protocol: Retrieving Instructions

MA ───────────────────────────────────▶ Controller

GET /**schedules**/f47ac10b-58cc-4372-a567-0e02b2c3d479

◀───────────────────────────────────

```
"name": "hourly measurements",
     "version": "1.0",
     "schedules": [{
          "name": "Hourly",              ◀─── Defined in report channels
          "tests": ["latency"],          ◀─── Defined in measurements
          "reports" :["hourly report"],
          "timing": {
              "timing_type": "calendar",
              "timing-config": {
                  "minutes": ["05"],
                  "seconds": ["30"]}
```

Next..

- The MA perfomrs the test
  - Sends the UDP packets
  - Receives replies
  - Calculates the 99% mean
- It is now ready to report the results back to the collector

Report Protocol

POST   //collector.example.org/results/f47ac10b-58cc-4372-a567-0e02b2c3d479
"name": "hourly measurements",
{ "report-date": "utc-milliseconds",
  "reporting-agent": "f47ac10b-58cc-4372-a567-0e02b2c3d479",
  "results": {"test-name": "latency",
            "test-agent": "f47ac10b-58cc-4372-a567-0e02b2c3d479",
            "test-parameters": { "name": "latency",
                "description": "UDP round trip latency",
                "metric": "UDP_Latency",
                "options": [{"environment": "No-cross-traffic",
                    "Output-type": "Xth-percentile-mean", "X": "99",
                    "Scheduling": "Poisson","rate": "5", "duration": "30.000",
                    "destination-ip": {"version": "4", "value": "192.0.2.1"},
                    "source-IP-address": {"version": "4", "value": "198.151.100.34"},
                    "destination-port": "50000", "source-port": "50000",
                    "start-time": "utc-milliseconds", "end-time": "utc-milliseconds"}]
            "test-results": {"Xth-percentile-mean": "10"}}}

Other considerations in the draft

- Use of different HTTP methods for the operations
- Handling communication failures
- Controller initiated communications
- Security (HTTPS)