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ICANN Monitoring System API (MoSAPI)

Francisco Arias

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Agenda

- gTLD's SLA
- SLA Monitoring (SLAM) System
- Monitoring System API (MoSAPI)
- Session handling
- Monitoring Methods
- Maintenance window (gTLDs)
- Probe node list
- Requesting access

gTLDs SLA

gTLD's SLA

	Parameter	SLR (monthly basis)
DNS	DNS service availability	0 min downtime = 100% availability
	DNS name server availability*	≤ 432 min of downtime (≈99%)
	TCP DNS resolution RTT*	≤ 1500 ms, for at least 95% of queries
	UDP DNS resolution RTT*	≤ 500 ms, for at least 95% of queries
	DNS update time*	≤ 60 min, for at least 95% of probes
RDDS	RDDS availability	≤ 864 min of downtime (≈98%)
	RDDS query RTT*	≤ 2000 ms, for at least 95% of queries
	RDDS update time*	≤ 60 min, for at least 95% of probes
EPP	EPP service availability*	≤ 864 min of downtime (≈98%)
	EPP session-command RTT*	≤ 4000 ms, for at least 95% of commands
	EPP query-command RTT*	≤ 2000 ms, for at least 95% of commands
	EPP transform-command RTT*	≤ 4000 ms, for at least 95% of commands

* Not implemented yet

Emergency Thresholds

Critical Function	Emergency Threshold
DNS Service	4-hour total downtime / week
DNSSEC proper resolution	4-hour total downtime / week
EPP*	24-hour total downtime / week
RDDS	24-hour total downtime / week

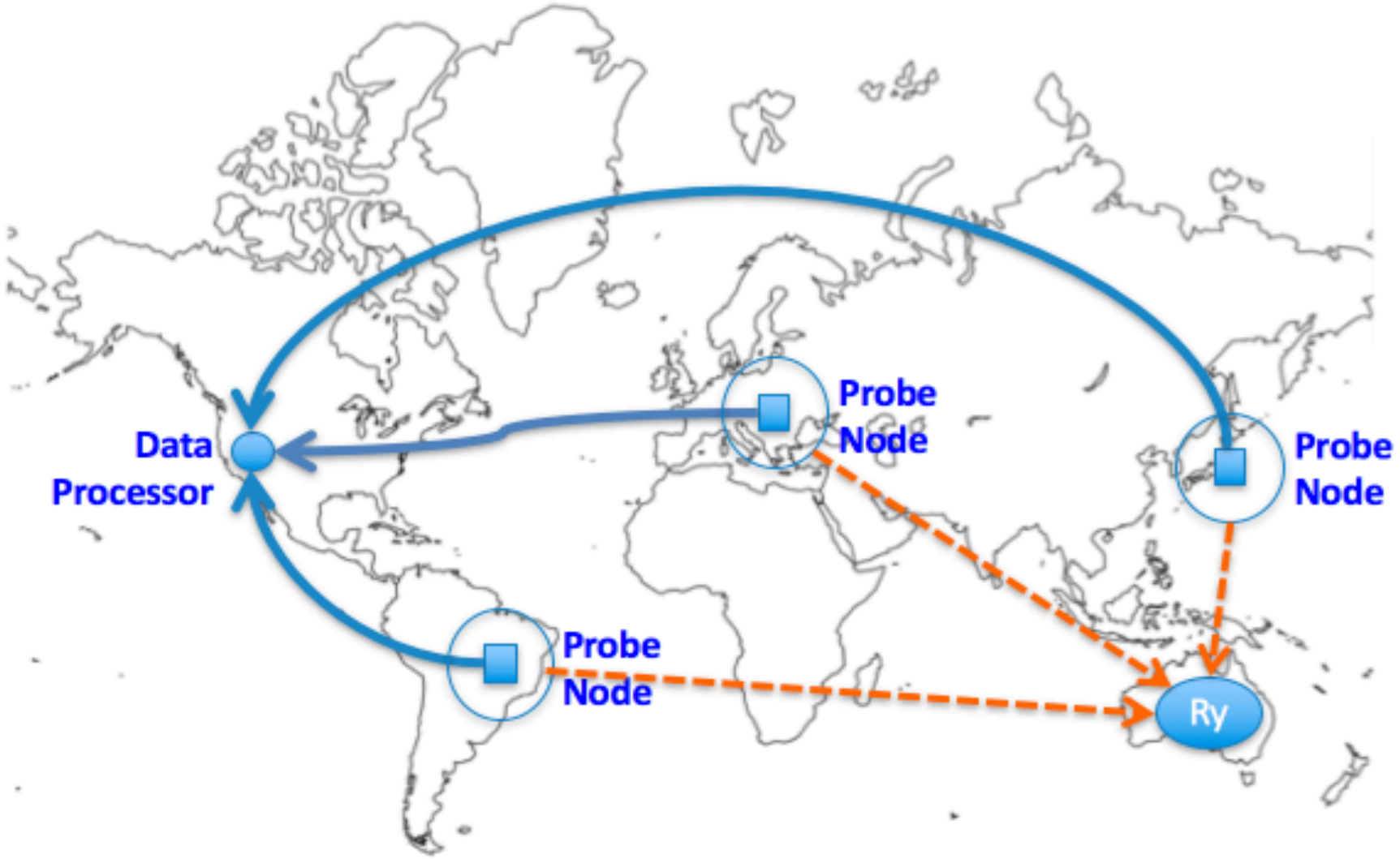
* Not implemented yet

SLA Monitoring (SLAM)

What is SLAM?

- Zabbix monitoring platform plus custom code
- Other parts of the code developed internally
- Probe node network consists of 40 probe nodes distributed globally
- Centralized servers that compile, analyze and act on the data collected by the probe nodes
- A Network Operations Center operating 24/7
- ICANN staff on-call 24/7

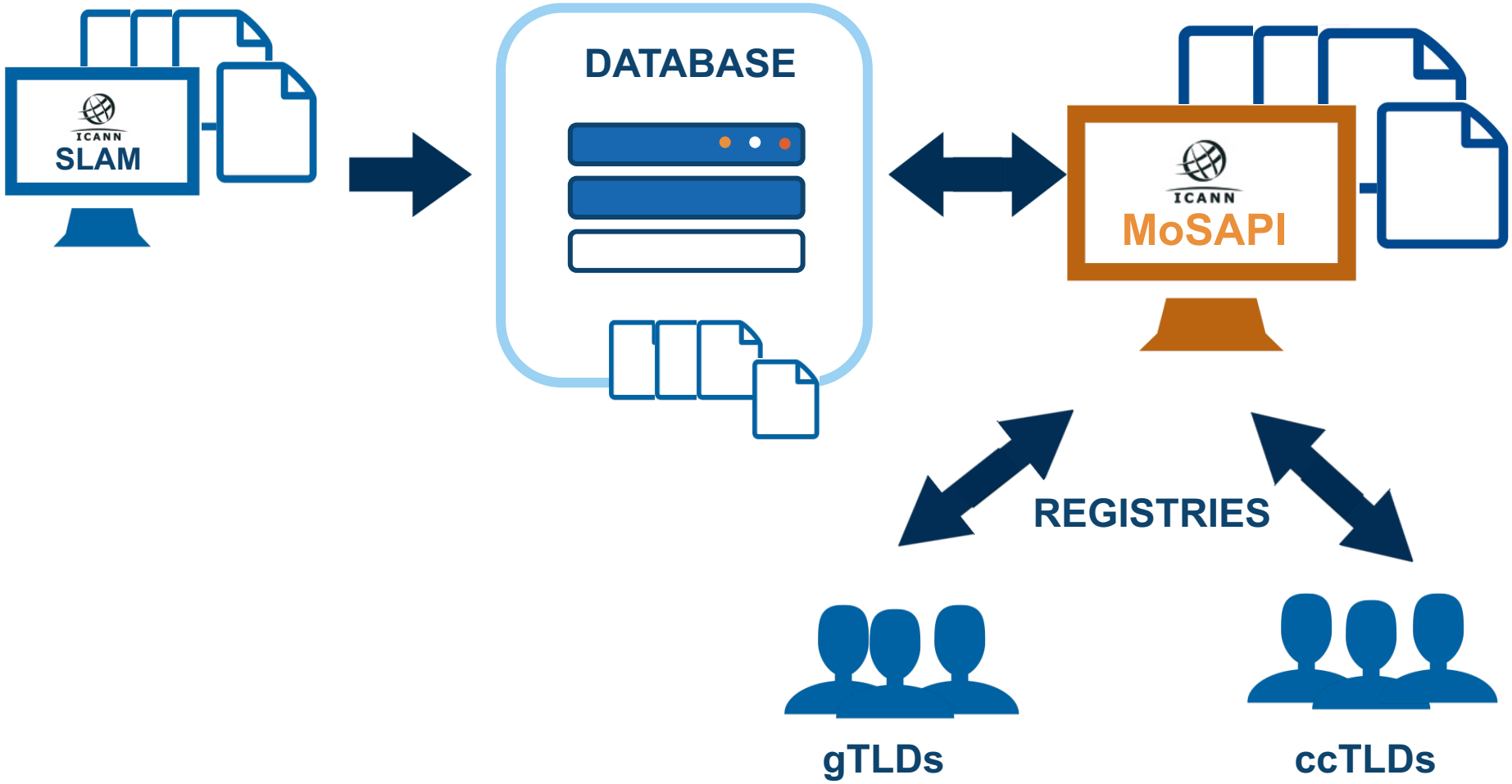
What is SLAM?



Monitoring System API (MoSAPI)

What is MoSAPI?

- REST API that allows Registries to retrieve information collected by the SLAM.



Benefits

Real time data*

Defining a maintenance window

ICANN will suspend Emergency Escalation services for a 10% alert

Proactive monitoring

Who can use MoSAPI?

gTLD Registry Operators

&

ccTLD Registry Operators

Session Handling

Session Handling

Username
Password
List of IP address blocks (IPv4/IPv6) per TLD

Authentication mechanism: HTTP Basic Access Authentication (RFC 2617)

Requires HTTPS

Session Handling

<base_url>: the base URL of the MoSAPI is:

https://mosapi.icann.org/mosapi/<version>/<tld>

`<version>`	Must be substituted by the version number of the specification supported by the server. For this specification its value must be 'v1'.
`<tld>`	Must be substituted by the TLD being queried. In case of an IDN TLD, the A-label must be used.

Creating a Session

<base_url>/login

```
curl --cookie-jar cookies.txt --user username https://mosapi.icann.org/mosapi/v1/example/login
```

- ✓ **HTTP/200:** Login successful.
- x **HTTP/401:** Invalid credentials.
- x **HTTP/403:** Your IP address is not allowed to connect for this TLD.

Only 2 concurrent sessions will be permitted per TLD.
A session is terminated:

- After its expiration time.
- Using the **`logout`** method.
- If a third session is successfully created; the oldest session would be the one terminated.

Closing a Session

<base_url>/logout

```
curl --cookie cookies.txt https://mosapi.icann.org/mosapi/v1/example/logout
```

- ✓ **HTTP/200:** Logout successful.
- x **HTTP/401:** Invalid session ID.
- x **HTTP/403:** Your IP address is not allowed to connect for this TLD.

The session to be deleted will be the one specified in the cookie

Session Handling

When sending a request to the MoSAPI, the client must set the HTTP header Cookie with the value "id=<sessionID>", where <sessionID> must be the 160-bit random value provided by the server in the last HTTP server response of a successful "login" request.

Monitoring Methods

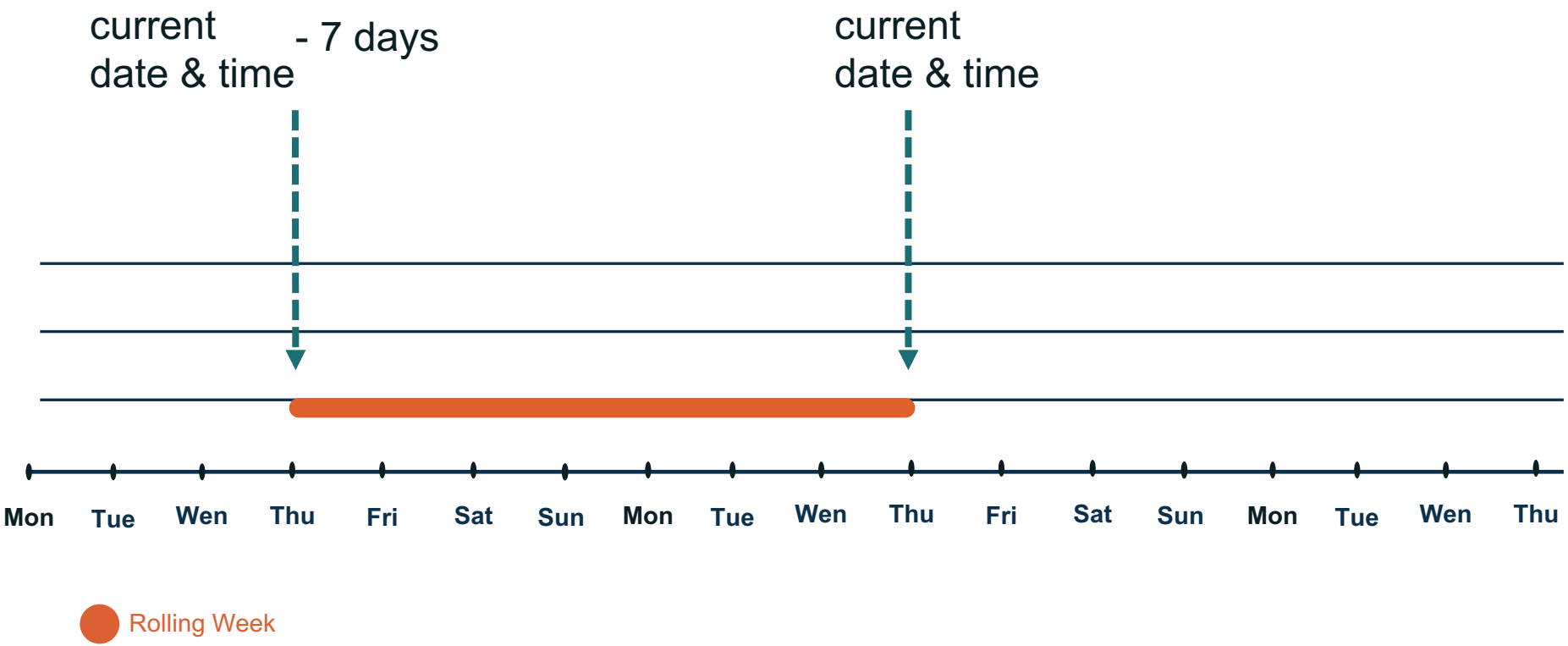
Incident

An incident is created when X of more sets of testing find the service down. X is 2 for RDDS and 3 for DNS and DNSSEC.

An Emergency Threshold Alert is caused by one or more incidents.

Rolling Week

The measurements of Incidents that occurred in the last 7 days are considered for the Service's Emergency Threshold calculations.



Monitoring the state of a TLD

<base_url>/monitoring/state

```
curl --cookie cookies.txt https://mosapi.icann.org/mosapi/v1/example/monitoring/state
 {
        "tld": "example",
        "lastUpdateApiDatabase": 1496923082,
        "status": "Down",
        "testedServices": {
                "DNS": {
                        "status": "Down",
                        "emergencyThreshold": "10.0000",
                        "incidents": [{
                                "incidentID": "1495811850.1700",
                                "endTime": null,
                                "startTime": "1495811850",
                                "falsePositive": false,
                                "state": "Active"
                        }]
                },
                "DNSSEC": {
                        "status": "Down",
                        "emergencyThreshold": "10.0000",
                        "incidents": [{
                                "incidentID": "1495811790.1694",
                                "endTime": null,
                                "startTime": "1495811790",
                                "falsePositive": false,
                                "state": "Active"
                        }]
                },
                "EPP": {
                        "status": "Disabled"
                },
                "RDDS": {
                        "status": "Disabled"
                }
        },
        "version": 1
}
```

You will be able to see:

- **the status of each of the TLD services,**
- **their Emergency Threshold percentage,**
- **the incidents that are part of the threshold.**

Incident Data Points


```
"DNS": {
        "status": "Down",
        "emergencyThreshold": "10.0000",
        "incidents": [{
                "incidentID": "1495811850.1700",
                "endTime": null,
                "startTime": "1495811850",
                "falsePositive": false,
                "state": "Active"
        }]
},
```


- **incidentID**
- **startTime:** Unix timestamp of the start of the Incident.
- **endTime:** Unix timestamp of the end of the Incident.
- **falsePositive:** a Boolean value indicating whether or not the Incident has been marked as false-positive.
- **state:** the current state (i.e. Active or Resolved) of the Incident.

Monitoring the Alarm status of a Service

<base_url>/monitoring/<service>/alarmed

```
curl --cookie cookies.txt  https://mosapi.icann.org/mosapi/v1/example/monitoring/dns/alarmed
 {
   "version": 1,
   "lastUpdateApiDatabase": 1422492450,
   "alarmed": "Yes"
 }
```

You will be able to see if a specified service is considered down:

- **Yes:** the service is down
- **No:** the services is up
- **Disabled:** the Service is not being monitored

Monitoring the Downtime of a Service

<base_url>/monitoring/<service>/downtime

```
curl --cookie cookies.txt  https://mosapi.icann.org/mosapi/v1/example/monitoring/dns/downtime

 {
   "version": 1,
   "lastUpdateApiDatabase": 1422492450,
   "downtime": 935
 }
```

downtime:
The number of minutes of downtime of the Service during a rolling week period.

Query Incidents for a Service

<base_url>/monitoring/<service>/incidents?startDate=<sD>&endDate=<eD>&falsePositive=<fP>


```
{
  "version": 1,
  "lastUpdateApiDatabase": 1422492450,
  "incidents": [
    {
      "incidentID": "1422492450.699",
      "startTime": 1422492450,
      "falsePositive": false,
      "state": "Active",
      "endTime": null
    },
    {
      "incidentID": "1422492850.3434",
      "startTime": 1422492850,
      "falsePositive": true,
      "state": "Resolved",
      "endTime": 1422492950
    }
  ]
}
```


- Optional: <sD>,<eD>, and <fP>.
- supports a maximum of 31 days difference between <sD> and <eD>.
- If only <sD> is provided, the API method will return results that are within 31 days after the date and time provided.
- If only <eD> is provided, the API method will return results that are within 31 days before the date and time provided.
- If neither <stD> nor <eD> are provided, the API method will return results that are within 31 days before the current date and time.
- If <eD> is in the future, the value of <eD> will be taken as the current date and time.

Monitoring the State of an Incident

<base_url>/monitoring/<service>/incidents/<incidentID>/state

```
curl --cookie cookies.txt
https://mosapi.icann.org/mosapi/v1/example/monitoring/dns/incidents/1422492450.699/state
```


```
{
  "version": 1,
  "lastUpdateApiDatabase": 1422492450,
  "incidents": [
    {
      "incidentID": "1422492450.699",
      "startTime": 1422492450,
      "falsePositive": false,
      "state": "Active",
      "endTime": null
    }
  ]
}
```


The current state (i.e. Active or Resolved) of an incident

Monitoring the False Positive Flag of an Incident

<base_url>/monitoring/<service>/incidents/<incidentID>/falsePositive

curl --cookie cookies.txt
https://mosapi.icann.org/mosapi/v1/example/monitoring/dns/incidents/1422492930.699/falsePositive


```
{
  "version": 1,
  "lastUpdateApiDatabase": 1422492450,
  "falsePositive": true,
  "updateTime": 1422494780
}
```


The False Positive flag is the only thing that may change after an Incident is resolved.

Measurement

Result of a particular test to a TLD service in a given time from all the probe node.

Querying the Measurements for an Incident

`<base_url>/monitoring/<service>/incidents/<incidentID>`

```
curl --cookie cookies.txt
https://mosapi.icann.org/mosapi/v1/example/monitoring/dns/incidents/1422492930.699

{
  "version": 1,
  "lastUpdateApiDatabase": 1422492450,
  "measurements": [
    "1422492930.699.json",
    "1422492990.699.json",
    "1422493050.699.json",
    "1422493110.699.json"
  ]
}
```

All the related test results of a particular incident

measurements: An array of measurementID values assigned by the monitoring system.

Querying the Details of a Measurement

<base_url>/monitoring/<service>/incidents/<incidentID>/<measurementID>

curl --cookie cookies.txt
https://mosapi.icann.org/mosapi/v1/example/monitoring/rdds/incidents/1422734490.699/1422734490.699.json


```
{
  "version": 1,
  "lastUpdateApiDatabase": 1422492450,
  "tld": "example",
  "service": "rdds",
  "cycleCalculationDateTime": 1422734490,
  "status": "Down",
  "testedInterface": [
   {
    "interface": "RDDS43",
    "probes": [
     {
      "city": "WashingtonDC",
      "status": "Down",
      "testData": [
       {
        "target": null,
        "status": "Down",
        "metrics": [
         {
          "testDateTime": 1422734513,
          "targetIP": "2001:DB8::1",
          "rtt": null,
          "result": "-200, No reply from name
server"
         }
        ]
       }
      ]
     },
```

```
{
                                                    513,
          {
           "testDateTime": 1422734508,
           "targetIP": "192.0.2.1",
           "rtt": 250,
           "result": "ok"
          }
         ]
        }
       ]
      }
     ]
    },
    {
     "interface": "RDDS80",
     "probes": [
      {
       "city": "WashingtonDC",
       "status": "Down",
"testData": [
```

```
                "result": "-200, No reply from name
server"
            }
           ]
          }
         ]
        },
        {
         "city": "Sydney",
         "status": "Down",
         "testData": [
          {
           "target": null,
           "status": "Down",
           "metrics": [
            {
             "testDateTime": 1422734508,
             "targetIP": "192.0.2.1",
             "rtt": null,
             "result": "-200, No reply from name
server "
            }]}]}]}]}
```


Provides the result of the tests from each of the probe nodes

Querying the Details of a Measurement

<base_url>/monitoring/<service>/incidents/<incidentID>/<measurementID>

curl --cookie cookies.txt
https://mosapi.icann.org/mosapi/v1/example/monitoring/rdds/incidents/1422734490.699/1422734490.699.json


```
{
  "version": 1,
  "lastUpdateApiDatabase": 1422492450,
  "tld": "example",
  "service": "rdds",
  "cycleCalculationDateTime": 1422734490,
  "status": "Down",
  "testedInterface": [
   {
    "interface": "RDDS43",
    "probes": [
     {
      "city": "WashingtonDC",
      "status": "Down",
      "testData": [
       {
        "target": null,
        "status": "Down",
        "metrics": [
         {
          "testDateTime": 1422734513,
          "targetIP": "2001:DB8::1",
          "rtt": null,
          "result": "-200, No reply from name
server"
         }
        ]
       }
      ]
     },
{
      "city": "Sydney",
      "status": "Up",
      "testData": [
       {
        "target": null,
        "status": "Up",
        "metrics": [
         {
          "testDateTime": 1422734508,
          "targetIP": "192.0.2.1",
          "rtt": 250,
          "result": "ok"
         }
        ]
       }
      ]
     }
    ]
   },
   {
    "interface": "RDDS80",
    "probes": [
     {
      "city": "WashingtonDC",
      "status": "Down",
"testData": [
       {
        "target": null,
        "status": "Down",
        "metrics": [
         {
          "testDateTime": 1422734513,
          "targetIP": "192.0.2.1",
          "rtt": null,
          "result": "-200, No reply from name
server"
         }
        ]
       }
      ]
     },
     {
      "city": "Sydney",
      "status": "Down",
      "testData": [
       {
        "target": null,
        "status": "Down",
        "metrics": [
         {
          "testDateTime": 1422734508,
          "targetIP": "192.0.2.1",
          "rtt": null,
          "result": "-200, No reply from name
server "
         }]}]}]}]}
```

DNS/DNSSEC Monitoring Error Codes

Result Code	Description
-200	No reply from name server
-201	The response received from the server is invalid.
-204	The response received form the server is malformed or the digital signature does not validate using the previously validated keyset.
-206	Error while validating the keyset of the TLD.

A future version of the API may add error codes in order to provide additional details regarding the issue being detected.

RDDS Monitoring Error Codes

Result Code	Description
-200	Connection timed out while trying to get a response from the server.
-201	Syntax error on RDDS43 output.
-204	Connection timed out while trying to get a response from the server.
-205	Error when trying to resolve the WHOIS server hostname.
-206	No HTTP/200 status code in response (after following redirects).

A future version of the API may add error codes in order to provide additional details regarding the issue being detected.

Maintenance Window (gTLDs only)

Suspend Emergency Escalation

ICANN will suspend Emergency Escalation services only for the 10% Emergency Threshold alert for RDDS and EPP when an enabled ("enabled” = true) schedule object exist, and the threshold is reached on a time covered by the "startTime" and "endTime".

Schedule Object Fields

- **version**: use "1".
- **name**: a descriptive name of the maintenance window.
- **enabled**: a Boolean value that indicates whether the maintenance window is enabled or not.
- **description**: a description of the maintenance widow.
- **startTime**: a Unix timestamp indicating the start of the maintenance window.
- **endTime**: a Unix timestamp indicating the end of the maintenance window.

Schedule Object Example

```
{
    "version": 1,
    "name": "load balancer upgrade",
    "enabled": true,
    "description": "The load balancer will be upgraded",
    "startTime": 1485941725,
    "endTime": 1486001764
}
```

- The startTime has to be at least 24 hours ahead of the current date and time
- The period specified cannot be greater than the monthly SLR for the service.

Create/Update a Schedule for a Maintenance Window

<base_url>/mntWin/<service>/<scheduleID>

```
curl --upload-file scheduleObject.txt --cookie cookies.txt -i
"https://mosapi.icann.org/mosapi/v1/example/mntWin/rdds/77795bf8-1d69-11e7-93ae-92361f002672"
```

- A schedule object is uniquely identified by a <scheduleID> identifier, an UUID generated by the user.
- You will not be able to update a maintenance window whose endTime is in the past.

Delete a Schedule for a Maintenance Window

<base_url>/mntWin/<service>/<scheduleID>

```
curl -X "DELETE" --cookie cookies.txt -i "https://mosapi-dev-
int.icann.org/mosapi/v1/icanntest3/mntWin/epp/77795bf8-1d69-11e7-93ae-92361f002672"
```

You may only delete a maintenance window that has not started

List Maintenance Windows that Have Not Ended

<base_url>/mntWin/<service>

```
curl --cookie cookies.txt https://mosapi.icann.org/mosapi/v1/example/mntWin/rdds
```


```
{
    "schedules": [{
        "scheduleID": "7b2d3012-41f7-4bce-89e9-9a9b85575fa6"
    }, {
        "scheduleID": "37e71da9-827d-450a-9909-a64ba42af1d8"
    }]
}
```

Probe node network

Probe Nodes List

<base_url>/monitoring/nodes

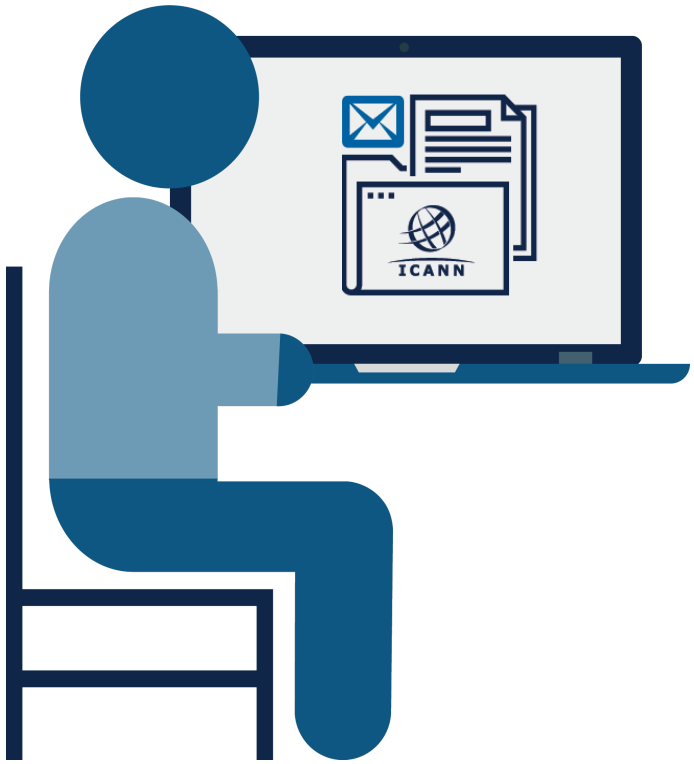
```
curl --cookie cookies.txt  https://mosapi.icann.org/mosapi/v1/example/monitoring/nodes

  {
    "version": 1,
    "updateTime": 1422492450,
    "probeNodes": [
      {
        "city": "Amsterdam",
        "ipV4": "192.0.2.3",
        "ipV6": "2001:DB8::3"
      },
      {
        "city": "Beijing",
        "ipV4": "192.0.2.4",
        "ipV6": null
      },
      ...
    ]
  }
```

List of all the probe nodes used by the Monitoring System.

Requesting Access

Request access



gTLDs

- Same username, password, and list of IP address blocks (IPv4 and/or IPv6) as the Registration Reporting Interface (RRI)

https://portal.icann.org/

ccTLDs

- Request authenticated relying on the ccTLD contacts in IANA

globalSupport@icann.org

When is it going to be available?

Engage with ICANN

Thank You and Questions

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