EDGE X FOUNDRY™

TSC Meeting

July 29, 2020

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Meeting Logistics

Time: Wednesdays 8am PDT – 9am PDT

Join from PC, Mac, Linux, iOS or Android: https://zoom.us/j/983155298

Or iPhone one-tap (US Toll): +14086380968,983155298# or +16465588656,983155298#

Or Telephone:

Dial: +1 408 638 0968 (US Toll) or +1 646 558 8656 (US Toll)

+1 855 880 1246 (US Toll Free)

+1 877 369 0926 (US Toll Free)

Meeting ID: 983 155 298

International numbers available: https://zoom.us/zoomconference?m=mkFexUxEcqHlvXHw53PqScTDRvS48PiQ

** TSC calls are recorded and added to Wiki post-call

TSC – Members Present Today

Company	Name	Email	Position
IOTech	Iain Anderson	iain@iotechsys.com	Device Services WG Chair
Intel	Ernesto Ojeda	ernesto.ojeda@intel.com	Dev Ops WG Chair
IOTech	Keith Steele	keith@iotechsys.com	Outreach WG Chair
Kong	Colin Hutchinson	colin@konghq.com	Security WG Chair
Intel	Mike Johanson	michael.johanson@intel.com	Applications & Analytics WG Chair
IOTech	James Butcher	james@iotechsys.com	Test/QA WG Chair
IOTech	Jim White	jim@iotechsys.com	Core WG Chair

Current quorum = 7 members

Note: Quorum for TSC meetings requires at least fifty percent of all voting members of the TSC to be present. The TSC may continue to meet if quorum is not met, but will be prevented from making any decisions at the meeting. Except as provided in Section 7.c. and 8.a, decisions by vote at a meeting require a majority vote of those in attendance, provided quorum is met. Decisions made by electronic vote without a meeting require a majority vote of all voting members of the TSC.

Today's Agenda

- WG Updates
- TSC Vote on CLI
- Performance #'s
- China Hackathon Update
- Upcoming Events (Dev Advocate)

Work Group Updates

Chairs

Working Group Chair Updates

- Around the horn
  - Product Manager - Lenny Goodell
  - Release Czar - Bill Mahoney
  - Applications - Mike Johanson
  - Device Services - Iain Anderson
  - Test/QA - James Butcher
  - DevOps - Ernesto Ojeda
  - Security - Colin Hutchinson
  - Outreach - Keith Steele
    - Certification - Rodney Hess
    - Marketing - Camilo Dennis
    - Vertical Solutions (and LF Edge TAC) - Henry Lau
  - Core/Supporting - Jim White

Product Manager (7/28/20)

Cross Cutting Issues (https://github.com/orgs/edgexfoundry/projects/35)

In Progress (5)

- V2 Implementations
    - **Working out last design decisions for Update DTOs and validation**
    - **App Service V2 Swagger WIP**
- Configurable address for ListenAndServe
    - **C Device Services last 2 services coming soon**
- Generate/Inject random passwords into Vault
    - **ADR PR Still needs reviewing (**https://github.com/edgexfoundry/edgex-docs/pull/141**)**
- Allow device services to be distributed to alternate hosts
    - SSH ADR PR in review (https://github.com/edgexfoundry/edgex-docs/issues/134)
    - **Needs to be added to the new edgex-examples repo**
- **Startup Configuration/Env does nothing**
    - **PR for fix in go-mod-bootstrap**

      (https://github.com/edgexfoundry/go-mod-bootstrap/pull/86**)**
    - **Impacts all services, but isn't a critical bug**

Backlog (2)

- Message Bus from Device Service to App Services
- **Multiple arch docker images support**
- **Dockerfiles incorrectly uses ENTRYPOINT**

Done (2)

- Refactored Compose files
- Remove Support Rules Engine (just from compose files)
- **Remove Client Monitoring**

Icebox (4)

- EdgeX Go services move to Go 1.15
- V2 API Consumption
- Drop Logging Service completely (Revert WIP)
- Remove Mongo code (Revert WIP)
- Update config.Clients usage for new naming scheme
- Explore possible collapse of core command and metadata
- EdgeX Metrics Collection & Control Plane Event Handling

Release Czar (7/29/20)

- ADR 0010 - Release Artifacts was approved and merged.
- Released device-sdk-go v1.2.3 (Issue [#548](#))
- Released device-sdk-c   v1.2.2 (Issue [#278](#))

Applications WG Update (29-July-2020)

- Met w/ UI team provided feedback for
- Bug Fix for when insecure secrets change MQTT Client not being refreshed
- App Service Configurable examples have been added to the new examples repo

App Working Group Meeting held on Thursdays @ 4:30PM PDT
  - Next meeting July 30th, 2020
  - Merged w/ Biweekly Rules Engine Meeting

Application Services

Functions (built into SDK)
Current/Complete:

- AES Encryption
- GZIP Compression
- ZLIB Compression
- MarkAsPushed
- PushToCore
- Device Name Filter
- Value Descriptor Filter
- **NEW!** Batch
- **NEW!** JSONLogic Filtering
- XML Conversion
- JSON Conversion
- MQTT(S) Export
- HTTP(S) POST Export

Features

- Store and Forward
- Web Server
- Configurable App Service
- **NEW!** Vault Integration for Secrets
- **NEW!** MQTT Event triggers (via go-mod-messaging)

Reference/Example App Services (Geneva)
(built on top of SDK)

- Azure IoT Hub — AVAILABLE
- Amazon IoT Core — AVAILABLE
- IBM Watson IoT
- Cloud Event Transformation — **NEW!**
- Secret Retrieval Example

Device Services WG Update (29-Jul-20)

Geneva point release:

- C SDK re-released
- device-grove update this week

Issue list:

- 22 in backlog (-2)
- 3 new issues (-2)

In progress:

- Requirements documentation (legacy)
- v2 API: Models/DTOs

Next WG meeting August 3

Device Services - current/coming (as of 5/7/20)

Open Source connectors (Current):

- Modbus (TCP/RTU) in Go
- Virtual Device in Go
- SNMP in Go
- MQTT in Go
- BACnet (IP & MSTP) in Go
- ONVIF Cameras in Go
- REST in Go (NEW!)
- Grove in C

Open Source connectors (Future):
- Bluetooth in C (summer 2020)
- BACnet (IP & MSTP) in C (summer 2020)
- OPC-UA in C (summer 2020)

Commercial connectors (Current):

- File Exporter in C
- BLE in C
- Zigbee in C
- GPS in C
- CAN in C
- MEMS in C
- EtherCat in C
- Profinet in C

There are additional commercial MQTT (Go), Modbus (Go), OPC-UA (in C) and BACnet (in C) that have added features over the community editions

Commercial connectors (Future):

- EtherNet/IP in C (summer 2020)
- CanOpen in C (summer 2020)
- OPC-UA Pub/Sub in C (summer 2020)
- ONVIF in C (summer 2020)

QA/Test WG Update (28th July)

- Postman blackbox test - **all tests passing**
- TAF blackbox test - **all tests passing**
  - New issues
    - Issue [#101](), design high level long run performance test
    - Issue [#137](), modbus scalability test
    - Issue [#138]()~[#143](), to implement basic performance metrics
  - Working issues
    - Issue [#102](), to design how to collect performance metrics data - what and how?
    - Issue [#99](), to create Core Data v2 API positive test cases
    - Issue [#100](), to create Core Data v2 API negative test cases
  - Fixed issues
    - Issue [#145](), missing some environments on docker-compose of device-service
- New Business
  - Design high level long run performance test base on v2 API

Postman Blackbox Test Cases

OS		DB	Total TCs No.	Failed TCs No. of Past Week	Failed TCs No. of This Week	Fixed TCs No.
x86_64 / CentOS	Non Security	Redis	1308	0	0	0
x86_64 / CentOS	Security	Redis	1338	0	0	0
arm64 / Ubuntu	Non Security	Redis	1308	0	0	0
arm64 / Ubuntu	Security	Redis	1338	0	0	0

TAF Functional Blackbox Test Cases

OS		DB	Total TCs No.	Failed TCs No. of Past Week	Failed TCs No. of This Week	Fixed TCs No.
x86_64 / CentOS	Non Security	Redis	52	0	0	0
x86_64 / CentOS	Security	Redis	52	0	0	0
arm64 / Ubuntu	Non Security	Redis	52	0	0	0
arm64 / Ubuntu	Security	Redis	52	0	0	0

TAF Integration Test Cases

Integration tests

OS		DB	Total TCs No.	Failed TCs No. of Past Week	Failed TCs No. of This Week	Fixed TCs No.
x86_64 / CentOS	Non Security	Redis	6	0	0	0
x86_64 / CentOS	Security	Redis	6	0	0	0
arm64 / Ubuntu	Non Security	Redis	6	0	0	0
arm64 / Ubuntu	Security	Redis	6	0	0	0

Compatibility tests

OS		DB	Total TCs No.	Failed TCs No. of Past Week	Failed TCs No. of This Week	Fixed TCs No.
x86_64 / CentOS	Security	Redis	12	0	0	0
arm64 / Ubuntu	Security	Redis	12	0	0	0

DevOps WG Update (07-29-2020)

Hanoi

- **Pipeline Enhancements**
    - edgex-go remove VERSION file now that git-semver is enabled. <u>PR-2645</u>
    - Audit DockerHub Images – <u>IT-20273</u> Ticket complete to LF to cleanup latest/test/rc tags.
    - Multi-Arch docker images on hold due to concerns. See Jim's email.
        - Losing visibility into DockerHub stats par architecture amd64 vs arm64 vs …
        - Potential increased developer complexity working with individual images
    - Large refactor of edgex-global-pipelines to enhance/simplify unit testing <u>PR-223</u>
    - Cleanup of non pre-release tags from edgex-global-pipelines version < v.1.0.87…
- **Other**
    - LF Infra Cost analysis
        - LF global pipeline library ready for use. Will be reviewing for use soon within the existing Jenkins pipelines.

Next DevOps WG Meeting 07/30/2020 @9:00AM PST

Security WG Update (07-29-2020)

- Hanoi release working items in progress/review
  - ADR's still pending
- SIR update
  - No major issues found
- Security WG meeting
  - Next Meeting: Today & Aug 5
- Security Board
  - 17 Done (+5)
  - 4 In Review (-1)
  - 1 In Progress (0)
  - 16 Backlog (-1)
  - 1 New (0)

Outreach WG Updates (7/22/20)

Certification Team

- An AWS template presented from Ricardo/Intel; polishing on Azure template

Vertical Solutions Team

- 7/28: Jiangxing Intelligence - Prof Jiangchuan Liu, CEO

Marketing Team

- Web site progress

Certification WG Update (6-15-20)

- Determining documentation requirements for the cloud templates
- Discussion on marketing needs for the Endorsement program

- Next meeting is Monday, June 29th, 9 a.m. PDT

Vertical Solutions WG Update (July 14, 2020)

- Kicked off the EdgeX Foundry Adopter Series
  - June 30th Accenture AIP+ adoption of EdgeX
    - Speaker: Allan Haughton, Digital Mobility Mobile IOT and Mobile Security lead
    - 70+ Attendees
  - July 14th Thundersoft, Tuesday 8AM Pacific
    - Speaker: Pengcheng Zou, CTO
  - Jiangxing Intelligence:
    - Speaker: Professor Jiangchuan Liu, CEO

  Register here: https://www.edgexfoundry.org/adopter-series/

Marketing update (7/14/20)

- Continue to drive Website project with El Roboto (3rd party)
  - Folder with key documents milestones and information at the Marketing WG wiki https://wiki.edgexfoundry.org/display/FA/Marketing+WG

Core Working Group (28-Jul-2020)

- Current Status
  - Backlog: 16 	 In progress: 5 	 Done: 25
  - Bugs: 5 	 Under review: 2
- Decision (subject to TSC disagreement) on V2 API path
  - use /openApi/v2 on Swagger path in repos (makes CI easier)
  - use /api/v2 on REST paths
- Decision (subject to TSC discussion or disagreement)
  - Drop old RAML files - they are obsolete anyway
- V2 API
  - working metadata DTOs & Events controller/handler
  - working on how to handle updates vs adds and DTO validation
- Next call - 7/30/20 @ 10AM US/Central tomorrow
  - V2 API
  - Requirements for UI
  - Kubernetes next steps

Miscellaneous Issues/Topics

- Vote on moving edgex-cli out of holding into its own repo in http://github.com/edgefoundry
  - Agreement reached to put it in a separate repository edgex-cli
  - Agreement that TSC should also approve the use of 3 libraries
  - Would be "released" independently like other clients (app serv, device serv, etc.)
  - Can release independently for minor releases; must keep up with EdgeX major releases
- As part of edgex-cli move, seek approval for 3 new modules used with the CLI

  - github.com/spf13/cobra v0.0.5, a library for creating powerful modern CLI applications

  - github.com/spf13/viper v1.3.2, , a complete configuration solution for Go applications
  - http://github.com/niemeyer/pretty, pretty print
  - OK'ed by core WG

Miscellaneous Issues/Topics

- EdgeX Examples repository has been created
  - Go ahead and move code in (with TSC approval)
- HomeEdge continues leverage EdgeX as an element in their product
  - Big thanks to Cloud and his team for continuing to support that effort and answer lots of questions
- Looking to appoint an EdgeX Secretary
  - Volunteer role
  - Help with Wiki updates
  - Meeting notes/postings
  - TSC meeting stand in
- Rework of docs continue
- Cancelled Aug 12th TSC & Aug 13th Core WG (Jim on vaca)
  - Aug 12th was to be APJ friendly time.
  - Monthly Arch's meeting is the 17th (monday). Can I move that to Thursday (20th)?

Geneva Performance # Review

James Butcher

Geneva Performance

Purpose of gathering these metrics:

- Provides metrics and marketing to potential users and customers of EdgeX who need to verify the platform is suitable for their use cases and target deployments
  - What memory and CPU will I need? How many gateways will I need for my deployment?
  - User typically want an upper limit number – need to reserve resources for their own apps etc

- Helps to identify bottlenecks or areas for improvement

- Able to spot regressions in performance following changes and correct them

- Performance should improve over time or at least be explainable given feature changes

- **We are not** looking to compare one architecture, OS or physical device, etc to another
  - EdgeX is agnostic of hardware, OS and architecture agnostic and must remain that way

Geneva Performance

What do we currently measure:

- **Footprint** – as both a raw compiled executable and within a container (e.g. Docker)

- **CPU** – percentage of CPU in use as each container starts

- **Memory usage** – amount of RAM (MB) as each containers starts

- **Start-up time** – how long to start the microservice and its container, both as a set and one-by-one

- **Operational Latency**:

  - **Ping** – how long to invoke the ping request on each microservice

  - **End-to-End** – measure of time taken from data ingestion at south side, transition through Core Services to export from Application Services

On what platforms:

- **Dell 3002 Gateway (Intel)**, Rasp Pi 3 (ARM) + added in Geneva: Rasp Pi 4 (ARM), HP MP9 (Intel)
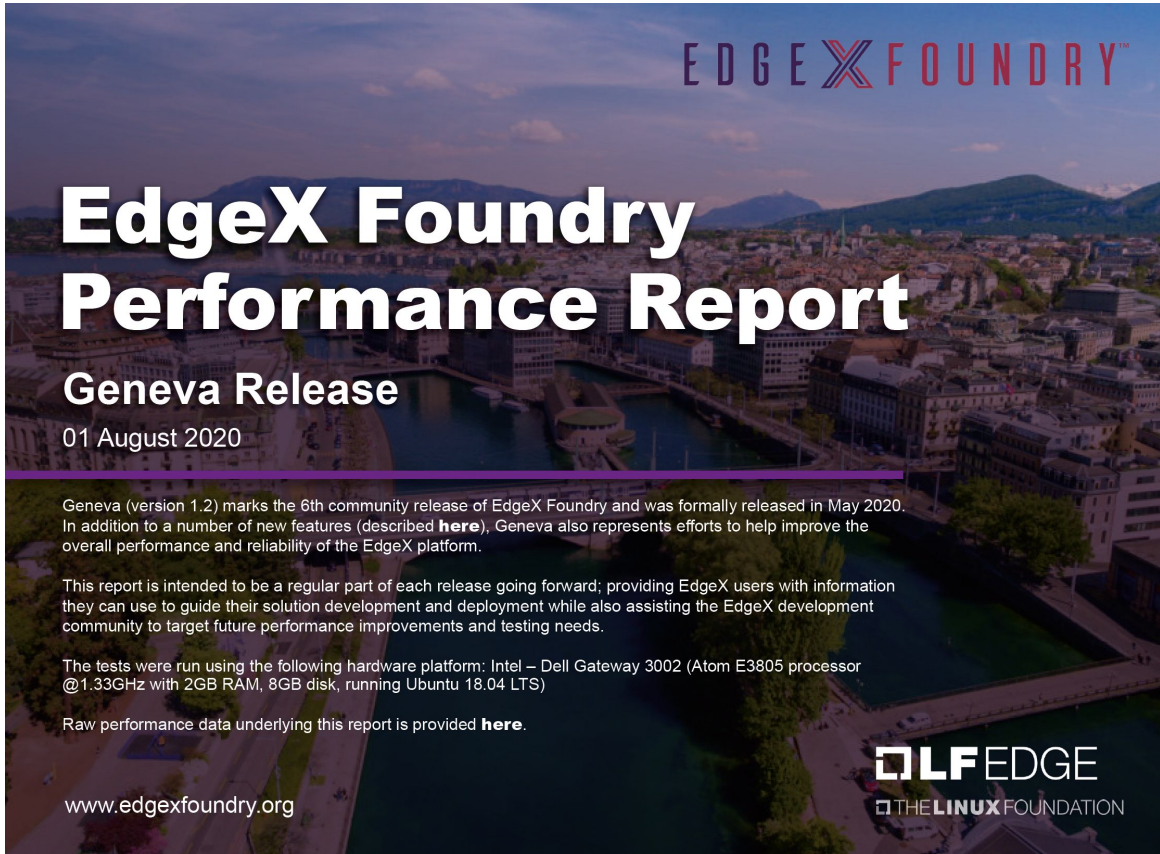
    Atom E3805 processor @1.33GHz with 2GB RAM, 8GB disk, running Ubuntu 18.04 LTS

Geneva Performance

All Metrics here: https://docs.google.com/spreadsheets/d/131AVzDQk0Bq8Y3_NePScoP2PPVzwxYBe2fuztG3jetA/edit#gid=0

Also PDF Report:

Geneva Performance - Footprint

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Microservice	Docker Image	Raw Executable
edgex-core-consul	139.26 MB	N/A (third party)
edgex-core-data	23.80 MB	15.65 MB
edgex-core-metadata	14.42 MB	14.41 MB
edgex-core-command	12.99 MB	12.98 MB
edgex-support-notifications	14.45 MB	13.12 MB
edgex-support-scheduler	13.12 MB	13.12 MB
edgex-app-service-configurable-rules	29.84 MB	21.18 MB
edgex-device-virtual	20.84 MB	15.23 MB
edgex-redis	29.78 MB	N/A (third party)

Comment:

- **General Deployment = 298 MB** (Fuji 336 MB)
- **Minimal Deployment (services highlighted in bold above) = 89 MB** (Fuji 99 MB)
- Consul most significant footprint
- Main Fuji differences – removal of logging as a default service, replace export-client and export-distro with one app service, reduced Core Data and Meta Data footprint

Geneva Performance - CPU and Memory

Microservice	Memory usage at startup	CPU usage at startup
edgex-core-consul	17.75 MB	2.29 %
edgex-core-data	5.11 MB	1.80 %
edgex-core-metadata	5.94 MB	2.01 %
edgex-core-command	3.67 MB	1.74 %
edgex-support-notifications	4.30 MB	1.70 %
edgex-support-scheduler	4.39 MB	1.52 %
edgex-app-service-configurable-rules	5.98 MB	0.15 %
edgex-device-virtual	6.49 MB	3.60 %
edgex-redis	2.14 MB	0.76 %

Comment:

- **General Deployment = 56 MB and 15% CPU** (Fuji 60 MB and 26% CPU)
- **Minimal Deployment = 31 MB and 8% CPU** (Fuji 37 MB and 4% CPU)
- Consul and the Device Service most significant

Geneva Performance - Startup Time (all at once)

Microservice	from docker up		from docker (up, stop) up	
	Binary	Container + Binary	Binary without creating container	Container + Binary without creating container
edgex-core-data	1.31	35.65	0.16	27.75
edgex-core-metadata	1.43	30.98	1.51	23.77
edgex-core-command	0.78	36.83	0.19	26.69
edgex-support-notifications	4.28	29.65	4.83	23.72
edgex-support-scheduler	6.11	30.34	3.58	23.66
edgex-device-virtual	3.60	44.42	6.53	41.56
Total startup time		**44.42**		**41.56**

Comment:

- **Improved from Fuji (59 and 52 seconds respectively)**
- Main Fuji differences – removal of logging as a default service, replace export-client and export-distro with one app service

Geneva Performance - Operational Latency

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Microservice	Ping response time
edgex-core-data	14.63 ms
edgex-core-metadata	8.43 ms
edgex-core-command	11.03 ms
edgex-support-scheduler	9.81 ms
edgex-support-notifications	9.15 ms
edgex-app-service-configurable-rules	9.88 ms
edgex-device-virtual	11.27 ms

Comment:
- The latency is different each time even if you ping the same service
- An average is more important than a single run – see Hanoi plan

Geneva Performance - Operational Latency

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The table shows end to end period of the 5 events as calculation samples extracted from core-data according to the 3 device names
Total average exported time: ==35.06 ms==

Device	Event exported time (pushed - origin)				
Random-Integer-Device	25 ms	14 ms	10 ms	10 ms	11 ms
Random-Boolean-Device	==339 ms==	12 ms	20 ms	18 ms	9 ms
Random-UnsignedInteger-Device	10 ms	12 ms	14 ms	11 ms	11 ms

Comment:

- Fuji figure was 16ms, but didn't consider the large first value at that time... see Hanoi Plan to improve reliability of numbers

Plan for Hanoi - Better Accuracy and Reporting

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- **Integrate to TAF**
  - For better alerting of issues, create a pass/fail based on a configurable threshold (% rise)
    - e.g. expecting a footprint rise with V2 API, but better to observe that as it happens
  - Also able to provide to community users, e.g. measure performance on your own platform
- **Better statistics - Maximum, Minimum, Average**
- **Start-up time**
  - Loop 5 times (configurable) and report an average
  - Verify CPU is stable prior to testing (nothing running on box)
- **CPU and Memory usage – sensitive to timings**
  - Scenario based on the Virtual Device Auto Events: Boolean(Per 10s), Integer(Per 15s), UInterger(Per 20s), Float(Per 30s)
  - Data gathered from "docker stats"
  - Loop 10 time (configurable) at a different (configurable) period, say 7 seconds to ensure not in step
- **Latency metrics**
  - Ping - loop 100 (configurable) times
  - Event Exports – loop 10 times, the first event which will have an initialization overhead

Plan for Hanoi - Additional Tests

Long Run Test

- Single and Mixed API continuous testing (e.g. Get/Put commands for 1 hour, 1 request per second)
- End to End Transaction continuous testing (e.g. for 5 devices with 10 Auto Events for 24 hours)
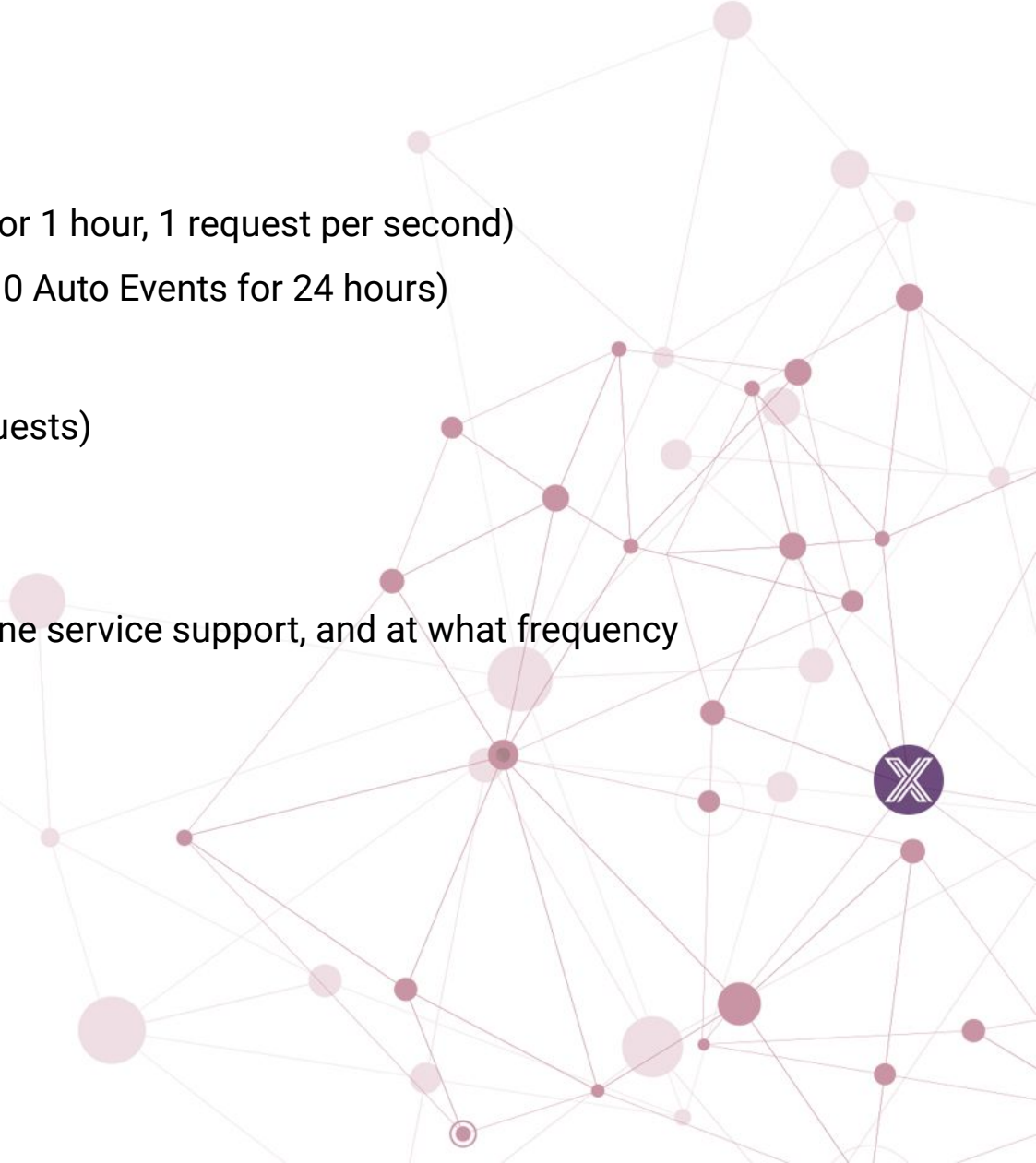
High Volume Testing

- Single API multiple requests (e.g. query device 10 times / 1000 requests)
- Single request to handle massive data (e.g. delete 10000+ events)

Scalability

- Modbus Device Service testing – how many Modbus Devices can one service support, and at what frequency

Metrics to collect

- Response time
- CPU and Memory (Average, Peak, Latest) - e.g. no leaks
- Failure Rate

China Hackathon

Thanks Melvin (Intel) & Gavin (VMWare)

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Snapshot of
EdgeX Challenge Shanghai 2020
till Jul 16th

https://wiki.edgexfoundry.org/display/FA/China+Project

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Snapshot

2020. 7. 03–20 — Registration & 1st round proposal submission

2020. 7. 21–24 — 1st round evaluation

2020. 7. 25–9. 14 — programing & demo video

2020. 9. 01–9. 14 — 2nd round submission

2020. 9. 14–25 — Voting via social media

2020. 9. 24–25 — 2nd round evaluation
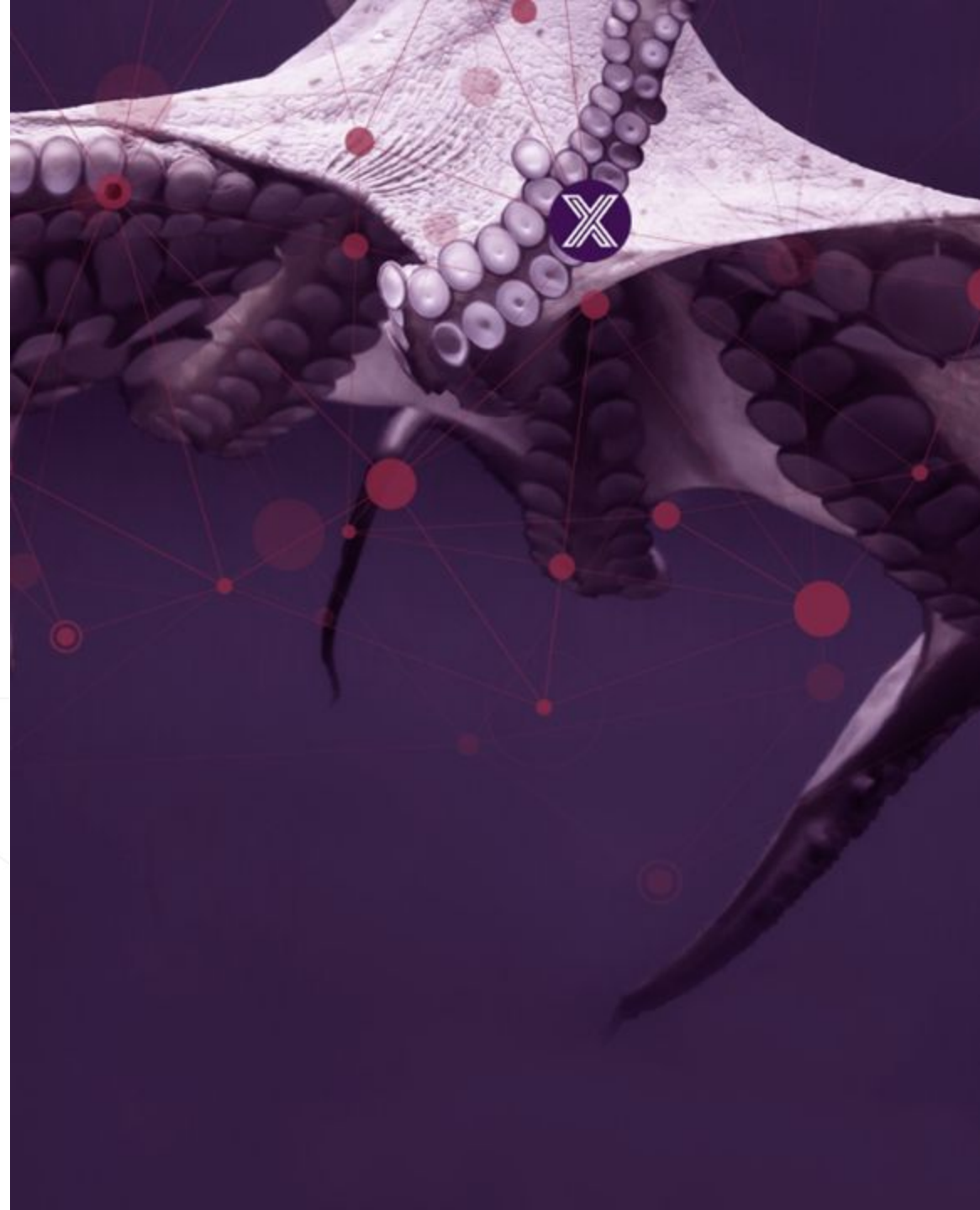
2020. 10 — Award announcement
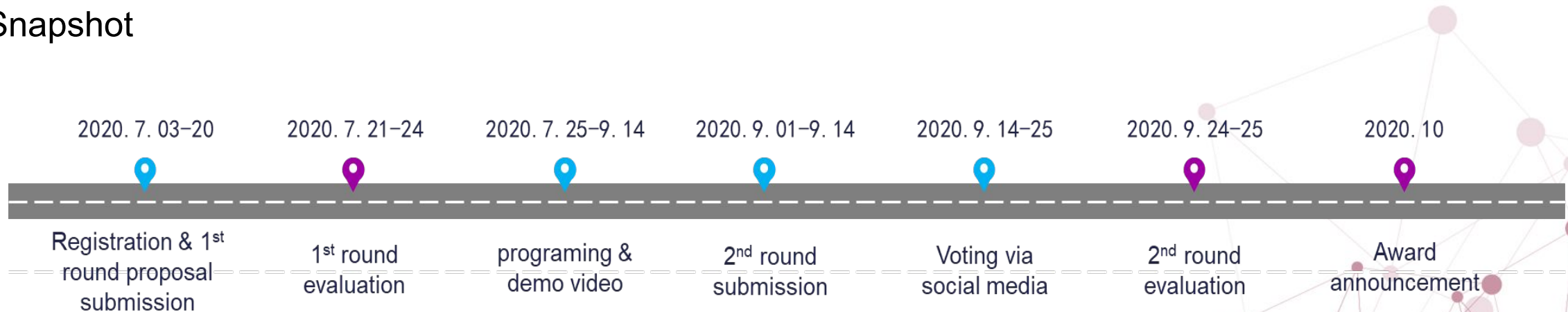
All sessions will be organized online as possible due to COVID-19

Organizations involved

Co-Hosts: LF Edge, STCSM

Sponsors & Co-organizers:
DELL Technologies, HP, Innospace, Intel, IOTech, Tencent, VMware

Two tracks:
- Commerce
- Industrial

Two rounds of contests
- 1st Round: Ideation challenge
- 2nd Round: Demo show-case

About opening ceremony on Jul 3rd
- Keynote speech: LF Edge, sponsors &co-organizers
- Total # of views: 16K

Participations (As of Jul 16th)
- Total # of registrations: 39
- Total # of submissions: 13

Reference links:
- Registration website
- Keynotes video
- Blog announcement

Use-case highlights (As of Jul 16th):
- **Commerce:** weight scale POS, retail store heatmap & monitoring, building automation control, service robot, parking management,…
- **Industrial:** Defects detection for manufacture line, data collection & analytics for oil/gas, industrial gateway, automation commissioning...

Some stats

16,000+ participants and growing

40+ teams submitted project proposals

   ~20 have been selected for final review

Melvin Sun (Intel) and Gavin Lu (VMWare) organizing

Rocky Jin from Kuiper team a judge

Upcoming External Events

› [Open Source Summit Japan](https://events.linuxfoundation.org/open-source-summit-japan/program/cfp/): 15-16 September, 2020 - Tokyo, Japan
   › CFP Closes July 11:
      https://events.linuxfoundation.org/open-source-summit-japan/program/cfp/
› Open Networking & Edge Summit North America: 28-29 September, 2020 - Virtual
   › ONES Unconference Track
› Open Source Summit Europe: 26-28 October, 2020 - Dublin, Ireland
   › CFP Closes July 26:
      https://events.linuxfoundation.org/open-source-summit-europe/program/cfp/
› KubeCon/CloudNativeCon North America: 17-20 November, 2020 - Boston, MA
› IoT Solutions World Congress: 11-13 May, 2021 - Barcelona, Spain

› Discussions around upcoming events occur in the LF Edge Outreach Committee
› Members may subscribe at: https://lists.lfedge.org/g/outreach-committee

LF Edge Webinar Series

› More to follow...

Upcoming Project Events

› **EdgeX Challenge Shanghai 2020**
  › Launch Date: July 3rd, 2020
  › Location: Shanghai + Online
  › Organizer: Linux Foundation APAC and Science & Technology Commission (STCSM) of Shanghai Municipal Government
  › Sponsors: Intel, VMware, InnoSpace, Dell Technologies, Thundersoft
  › Supporting Organizations: CCFA (China Chain Store & Franchise Association), Tencent, IOTech
  › Tracks:
    › Commercial (Retail, Hospitality, Banking, Education, etc.）
      › Using EdgeX, based on IOT, AI and data analysis technologies, build innovative applications related to consumer, merchandise, and store.
      › Use EdgeX to build multi-sensor correlated IoT applications.
      › Use EdgeX to build applications beneficial to defeat COVID-19.
      › Combine EdgeX with 5G, blockchain or service robot to build innovative applications
    › Industrial (Factories, Power, Oil/Gas, Utilities）
      › For the multi-edge node scenario, build an SDN + containerized IT solution based on EdgeX
      › In discrete or process (with lower latency requirements) manufacturing, use EdgeX to achieve low latency fault detection and response on the production line
      › In Discrete Manufacturing, use EdgeX to Detect Product Defects Online
      › Using EdgeX to collect data, proceed with energy management of electric/gas/coal/oil, to improve energy efficiency. (Such as: building a thermodynamic model, completing heat meter data collection and automatic valve opening control to optimize heating efficiency)
      › Using EdgeX to realize remote unmanned monitoring of multiple data sources and automatic control of the on-site environment.

Linux Foundation edX Course

› Business Considerations for Edge Computing:
https://www.edx.org/course/business-considerations-for-edge-computing

› Official EdgeX Training at LF
› https://training.linuxfoundation.org/training/getting-started-with-edgex-foundry-lfd213/

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Thank You

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