LF Edge TAC Technical Advisory Council 13 January 2021 THELINUX FOUNDATION LFEDGE

Meeting Details

- > January 13, 2021 (@ 7:00am PST)
- Meeting Info:
 - > Meeting URL: https://zoom.us/j/94796108342?pwd=VjlaMTBxcXFQQ3pVcU85NTJvWkxaZz09
 - > Calendar Subscription: https://lists.lfedge.org/g/TAC/calendar





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LF Edge TAC

Project/ Member	Representative	Named Alternate	Project/ Member	Representative	Named Alternate
Altran	Shamik Mishra	Nilanjan Samajdar	HP Inc.	Henry Lau	
Arm	Reed Hinkel	Tina Tsou	Huawei	JianGuo Zeng	Gabriel Yuyang
AT&T	Kandan Kathirvel		IBM	Joseph Pearson	Ryan Anderson
Baidu	Leding Li		Intel	Jim St. Leger (TAC Chair)	Sharad Mishra
Charter	Jeffrey Saelens	Mohammad Zebetian	Nokia	Tapio Tallgren	
Dell	David Lake	Trevor Conn	NTT	Takeshi Kuwahara	
Dianomic	Mark Riddoch	Tom Arthur	OSIsoft	Daniel Lazaro	
Equinix	Justin Dustzadeh		Radisys	Adnan Saleem	Prakash Siva
Ericsson	Torbjörn Keisu	Andrew Wilkinson	Red Hat	Anil Vishnoi	Thomas Nadeau
Fujitsu	Toshimichi Fukuda	Hatsumi lino	Samsung	MyeongGi Jeong	Chi-Hyun Cho
Futurewei	Chaker Al-Hakim	Jane Shen	Tencent	Yachen Wang	Wei Chen





LF Edge TAC

Project/ Member	Representative	Named Alternate	Project/ Member	Representative	Named Alternate
Western Digital	Jorge Campello De Souza		Akraino	Tina Tsou	Oleg Berzin
Wipro	Subhas Mondal		EdgeX Foundry	Henry Lau	
ZEDEDA	Erik Nordmark	Roman Shaposhnik			



Topics

- 1. Open Horizon Mentorship Program Recap [10 minutes]
- 2. LF Edge Shared Community Lab [10 minutes]
- 3. Annual Review: Akraino [20 minutes]
- 4. Upcoming Events / Next Meeting



Open Horizon Mentorship Program - Recap Joe Pearson Anukriti Jain

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Open Horizon Mentorship Program - Recap

- https://www.lfedge.org/2021/01/12/open-horizon-mentorships-with-lfx/
- Mentee Experience read-out: <u>Anukriti Jain</u>

For more information, learn more about LFX Mentorship at https://lfx.linuxfoundation.org/tools/mentorship / https://docs.linuxfoundation.org/lfx/mentorship



LF Edge Shared Community Lab Jim St. Leger

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LF Edge Lab

- Subgroup last met on January 6 to continue iteration of <u>TAC Subcommittee</u> <u>Charter: LF Edge Shared Community Lab</u> (<u>notes</u>)
- Barring any objections, ready for TAC vote to approve/adopt the Charter
- Action: TAC vote to approve/adopt the <u>TAC Subcommittee Charter: LF Edge Shared Community Lab</u>
- Next step is updating the <u>Acceptable Usage Policy</u>
 - > Input welcome

- Next Subgroup meeting scheduled for Wednesday, January 20
 - > Email Brett to be added to invite



Annual Review Akraino

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Annual Reviews

- 1. Project Annual Reviews Overview/Process: https://wiki.lfedge.org/display/LE/Project+Annual+Reviews
- 2. Other Projects with reviews coming up:

Project	Accepted	Last Reviewed	Next Review Due	Maturity Level
Akraino	1/24/19	12/3/19	12/3/20 (scheduled 1/13/21)	Stage 3 - Impact
Baetyl	8/5/19	12/2/20	12/2/21	Stage 1 - At Large
EdgeX Foundry	1/24/19	8/26/20	8/26/21	Stage 3 -
EVE	1/24/19	12/2/20	12/2/21	Stage 2 - Growth
Fledge	6/27/19	7/19/20	7/19/21	Stage 2 - Growth
Home Edge	1/24/19	10/21/20	10/21/21	Stage 2 - Growth
Open Horizon	4/9/20	4/9/20	4/9/21	Stage 1 - At Large
Secure Device Onboard	6/4/20	6/4/20	6/4/21	Stage 1 - At Large
State of the Edge	1/24/19	12/2/20	12/2/21	Stage 2 - Growth



Akraino Annual Review Ike Alisson, ALICON SWEDEN

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LF EDGE TAC Akraino Annual Review Summary

Annual Review Wiki Page: https://wiki.lfedge.org/display/LE/Akraino+-+Stage+3+-+2021-01-13

Project Highlights

- > LF Edge Akraino Project is a set of Open Infrastructures and Application Blueprints (BPs) for the Edge, spanning a broad variety of Use Cases, including 5G, AI, Edge laaS/PaaS, IoT, for both Service provider and Enterprise Edge Domains.
- Akraino Release 3 (R3), approved in August 2020, included 6 new Blueprints, namely 1. 5G MEC/Slice System to Support Cloud Gaming, HD Video and Live Broadcasting Blueprint, 2. The Al Edge: Education Video Security Monitoring, 3. Micro-MEC, 4. IEC Type 3: Android Cloud Native Applications on Arm servers on the Edge, 4. IEC Type 5: SmartNIC for Integrated Edge Cloud, 6. Enterprise Applications on Lightweight 5G Telco Edge.
- > Some of the selected new Blueprints for Release 4 (R4) are related to Connected Vehicle, AR/VR oriented Edge Stack for Integrated Edge Cloud (IEC), Radio Edge Cloud (REC), The AI Edge: Intelligent Vehicle-Infrastructure Cooperation System(I-VICS), 5G MEC/Slice System to Support Cloud Gaming, HD Video and Live Broadcasting, IEC Type 3: Android Cloud Native Applications on Arm Servers in Edge for Integrated Edge Cloud (IEC), Enterprise Applications on Lightweight 5G Telco Edge, Public Cloud Edge Interface (PCEI), The AI Edge: Federated ML Application at Edge, Private LTE/5G ICN, IoT Workloads at the Smart Device Edge Predictive Maintenance (with a Thermal Imaging Camera, Vibration Sensors).
- Akraino API Portal plans to present an API map where all Release 4 (R4) Project APIs will be organized and published. The API Portal will include both API map navigation and search capability, to allow customers to investigate APIs they may need. In addition to blueprint projects' mandatory baseline API info, optional information about (a) telco network interface APIs, and (b) Kubernetes environment APIs info will be collected. This will be used to support one-stop API presentation, analysis, comparison, finding similar APIs, and sandbox/sample code.

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1. Akraino Project R3 Overview - 1

- -18 Blueprints (BPs), 4 BPs Proposals & 10 Development Projects
 - set of Open Infrastructures & Application Blueprints (BPs)

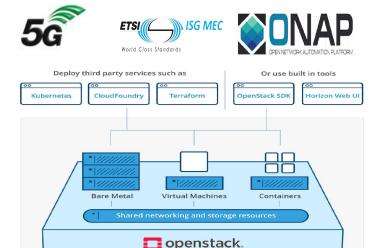
- Coordination & Co-operation with Multiple Upstream Open Sourc Communities/SDOs as:
 - Airship,
 - OpenStack,
 - ONAP,
 - ETSI MEC,
 - GSMA,
 - TIP,
 - CNCF



Objective: To deliver a fully integrated stack

What is Akraino? Everything About Edge - Akraino is the Edge Project





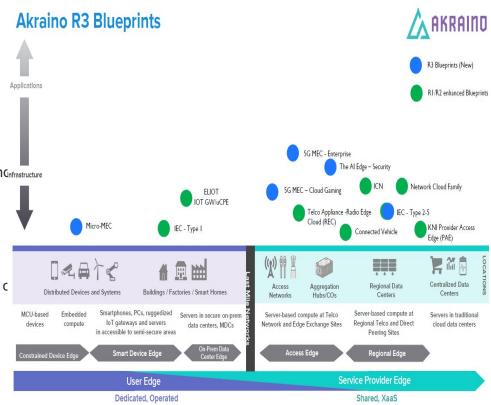
1. Akraino Project R3 Overview - 2

-Akraino Release 3 (R3) - approved in August 2020

-Akraino Release 3 (R3) included 6 new Blueprints:

1. 5G MEC/Slice System to Support Cloud Gaming, HD Video an Confrastructure Live Broadcasting Blueprint

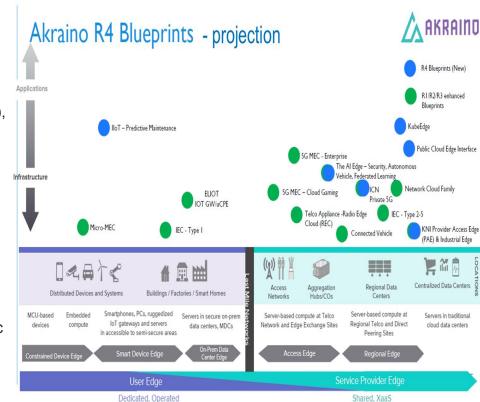
- 2. The AI Edge: Education Video Security Monitoring;
- 3. Micro-MEC
- IEC Type 3: Android Cloud Native Applications on Arm servers c the Edge
- 5. IEC Type 5: SmartNIC for Integrated Edge Cloud
- 6. Enterprise Applications on Lightweight 5G Telco Edge





1. Akraino Project R3 Overview - 3

- -Akraino Release 4 (R4) projected early Q1 2021
 - Connected Vehicle,
 - AR/VR oriented Edge Stack for Integrated Edge Cloud (IEC),
 - Radio Edge Cloud (REC),
 - The AI Edge: Intelligent Vehicle-Infrastructure Cooperation System(I-VICS),
 - 5G MEC/Slice System to Support Cloud Gaming,
 - HD Video and Live Broadcasting,
 - IEC Type 3: Android Cloud Native Applications on Arm Servers in Edge for Integrated Edge Cloud (IEC),
- Enterprise Applications on Lightweight 5G Telco Edge, Public
- Public Cloud Edge Interface (PCEI),
- The Al Edge: Federated ML Application at Edge,
- Private LTE/5G ICN
- IoT Workloads at the Smart Device Edge Predictive





ETSI MEC: An Introduction

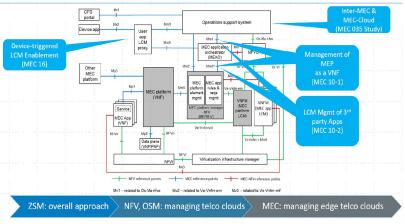
(almost) everything you want to know about ETSI MEC

Presented by: Alex Reznik, ISG Chair
ETSI MEC Leadership Team

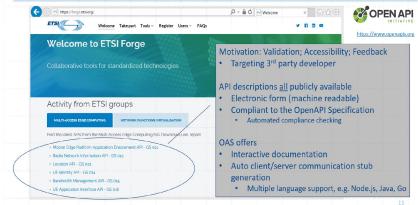
For: Public consumption
Akraino TSC
Sept 23-24, 2020



A key part of ETSI Network Automation Standards



ETSI Forge OpenAPI repository



Google Anthos

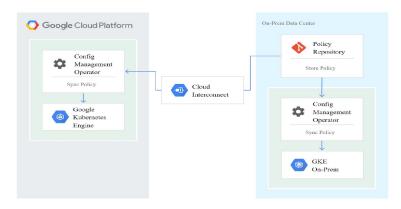
by

Prajakta Joshi

Akraino TSC 2020-10-06

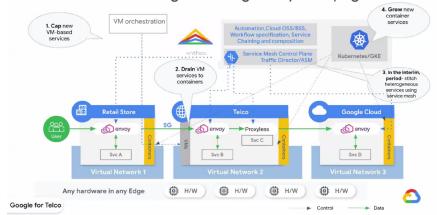


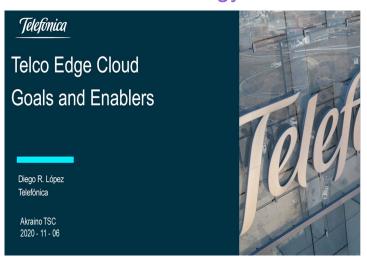
Centralized config management



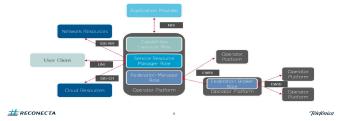
Anthos Config Management architecture (click to enlarge)





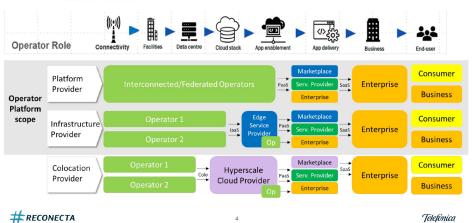


The Framework



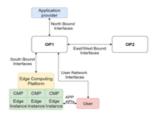


The Value Chain



The Unified Edge Theory

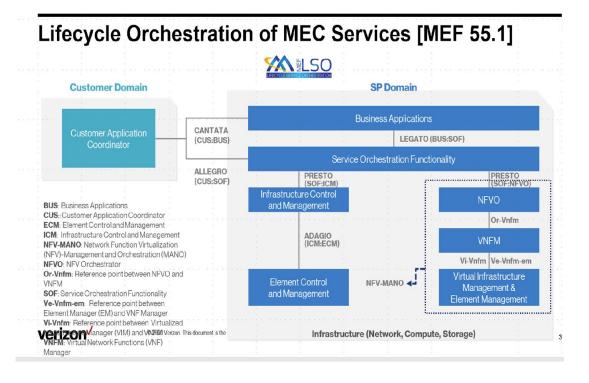
- · The edge environment has to work as a single cloud provider
 - o Consistent APIs for developers: Build once, run anywhere
 - Support for different deployment styles
 - Multi-dimensional openness
- · The Ultimate Goal: In-Network Computing
 - A service continuum based on
 - Programmable network devices
 - Languages and abstractions to implement network functions
 - Data-plane abstractions and new network protocols to efficiently federate decentralized computing
 - Decentralized security and discovery mechanisms
 - End-to-end orchestration of all kind of resources and functionalities





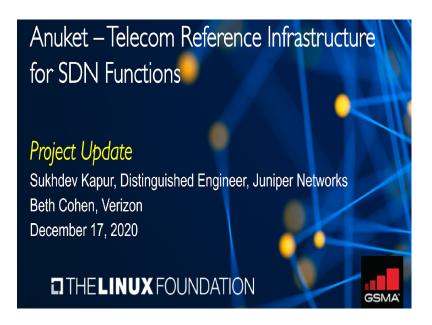
Mapping ETSI MEC Architecture to MEF LSO Architecture Mehmet Toy, Ph.D Ass. Fellow Verizon December 2020

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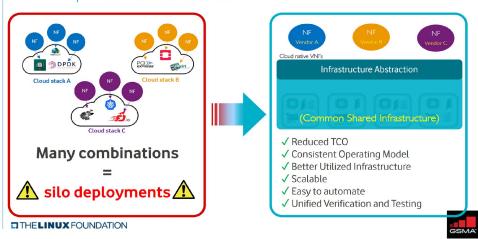


verizon

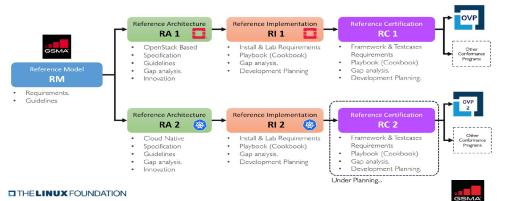




Anuket | Problem Statement



Anuket | Workstreams (WS)



3. Akraino 2021 API related activities - 1

Akraino API Sub-committee TSC Mission:

Chair: <u>Jeff Brower</u> Co-Chair: <u>Jane Shen</u>

Develop an API Plan for the Akraino BPs Collaboration + Development.

The TSC has asked the API subcommittee to identify commonality between APIs, and possibly identify a "base" set of Akraino Edge Computing APIs.

This is future work, under discussion.





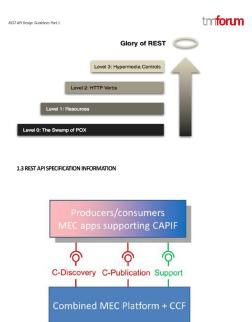


Figure 4.3.3-1: Fully-integrated hybrid deployment of CAPIF and MEC

3. Akraino 2021 API related activities - 2

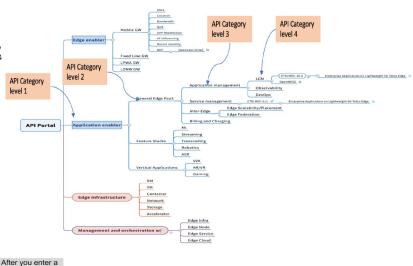
Akraino Blueprint Projects R4 API Reporting Requirement

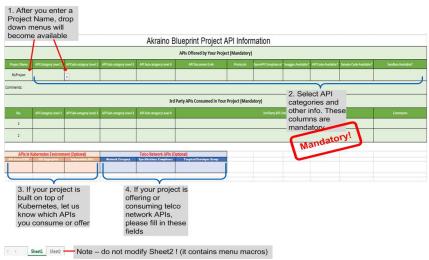
- All R4 BPs Project APIs will be organized and published on the <u>API map</u> page of the Akraino <u>API Portal</u>.
- The API Portal will include both:
 - API Map Navigation and
 - Search Capability
- In addition to BP Projects' mandatory baseline API info, optional information about:
- (a) Telco Network Interface APIs, and
- (b) Kubernetes Environment APIs Info will be collected.

This will be used to support:

- One-stop API Presentation,
- Analysis, Comparison, finding similar APIs, and
- Sandbox/Sample Code.









Questions?



Upcoming Events

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Upcoming External Events

Additional LF Edge events available at: https://www.lfedge.org/events/

- > Open Source Summit North America: 3-6 August, 2021 Vancouver, Canada
- > Open Source Summit Europe: 28 Sept 1 Oct, 2021 Dublin, Ireland
- > <u>IoT Solutions World Congress</u>: 5-7 October, 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

- Akraino Edge Stack
 - Held Thursday, April 2 Your Path to Edge Computing with Akraino Edge Stack
 - On-demand recording available at: https://zoom.us/webinar/register/WN Zido4-5fTOSlgH7pL8iHrO
- EdgeX Foundry
 - Held Thursday, April 23 EdgeX Foundry 101: Intro, Roadmap and Use Cases
 - > On-demand recording available at: https://zoom.us/webinar/register/4515850788014/WN_xCd6YPiEOrCwLiFhBWPKug
- Project EVE
 - Held Friday, May 29 <u>Building the "Android of the IoT Edge"</u>
 - On-demand recording available at: https://zoom.us/webinar/register/6415888722675/WN 35oZl3hrOE69snMailUTPg
- White Paper
 - > Held Thursday, July 9 Demystifying the Edge with the new LF Edge Taxonomy and Framework
 - On-demand recording available at: https://zoom.us/webinar/register/WN icv5h6wFTcuw9O0xvMpgLw
- Fledge
 - Held Thursday, August 13 How Google, OSIsoft, FLIR and Dianomic use Fledge to implement Industrial 4.0
 - Recording available at: https://www.voutube.com/watch?v=6|XNv3A|Wog
- State of the Edge
 - > Held Thursday, September 17 State of the Edge: Exploring the Intersection of IoT, Al. 5G and Edge Computing
 - On-demand recording available at: https://zoom.us/webinar/register/8115959695936/WN_4rt-MmP1Rl6Vkzn3ULpiAA
- > Home Edge
 - Held Thursday, October 15 Home Edge: How Your Home Devices Get Deployed in An Edge Computing Services Ecosystem
 - > On-demand recording available at: https://zoom.us/webinar/register/WN_uSlgb-R5O4etkDhxoSXISO
- Open Horizon
 - > Held Thursday, November 19 Secure Application Management for Machine Learning & Constrained Devices
 - On-demand recording available at: https://zoom.us/webinar/register/WN tYli1JZ1RWq1pml8FuPRPw
- More to follow...





LF Mentorship + LFX Webinar Series

- > LF Live Mentorship Series: Open Source Licensing
 - January 13 (10am PST) https://events.linuxfoundation.org/mentorship-session-os-licensing/
- LFX Insights: Get a 360° View of Your Project
 - > January 14 (9am PST) https://linuxfoundation.org/webinars/lfx-insights-get-a-360-view-of-your-project/
- > LFX Security: Help Secure the Open Source Ecosystem
 - January 20 (9am PST) https://linuxfoundation.org/webinars/lfx-security-help-secure-the-open-source-ecosystem/
- LF Live Mentorship Series: 2nd Place is the First Winner: Maintainership and Growing Your Influence in the Linux Kernel Community
 - > January 22 (9:30am PST)
 - https://events.linuxfoundation.org/mentorship-session-maintainership-growing-influence-kernel-community/
- LF Live Mentorship Series: Coccinelle: Automating Large-scale Evolution and Bug Finding in C Code
 - February 2 (7:30am PST) https://events.linuxfoundation.org/mentorship-session-coccinelle/
- > LF Live Mentorship Series: New Ideas for Smatch (Static Analysis)
 - > February 11 (8:30am PST) https://events.linuxfoundation.org/mentorship-session-smatch/
- > LF Live Mentorship Series: Which Hat Do I Wear Today? The Balancing Act of Working with Upstream and Product Teams
 - > February 25 (9:30am PST) https://events.linuxfoundation.org/mentorship-session-which-hat-do-i-wear/
- Join the LF Live: Mentorship Series mailing list and be alerted when new sessions are added!
 - > Sign up available at the bottom of https://events.linuxfoundation.org/lf-live-mentorship-series/
- > Full list of LF Webinars (upcoming/recorded) available at https://linuxfoundation.org/webinars/





Linux Foundation edX and Training Courses

- Business Considerations for Edge Computing:
 https://www.edx.org/course/business-considerations-for-edge-computing
- Getting Started with EdgeX Foundry (LFD213):
 https://training.linuxfoundation.org/training/getting-started-with-edgex-foundry-lfd213/
- > Full list of courses available at https://training.linuxfoundation.org/



Upcoming Project Events

- > Akraino Technical Meetings Spring: 1-3 March, 2021 Virtual
 - > Registration coming soon

Projects can add their events to this list by sending the Wiki page listing the information to info@lfedge.org



Next Meeting

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Next Meeting

> Next Meeting: Wednesday, January 27 @ 7am PST

> Topics?

> ..





Thank You

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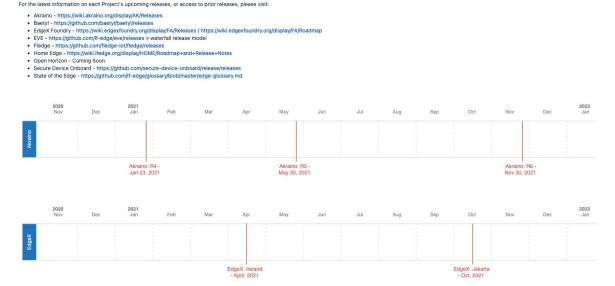
Backup/Resources

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Upcoming Release Calendar

- > Reminder to Projects to please review and update as needed
- > https://wiki.lfedge.org/display/LE/Upcoming+Release+Calendar





Release dates are subject to change.



TAC - Focus Areas for 2020 (what to emphasize / de-emphasize in 2021?)

Target areas identified for the TAC to direct focus, beyond PLD/Project Review

- 1. Architecture (Tech > LF Edge) Output: TBD (White paper?)
- 2. APIs Document, Align and Publish
- 3. SDO/Consortiums expansion
- 4. Forcing function Use Case or Deployment > Demo across all projects
- 5. Technical overlap/unification
- 6. Cross Project Collaboration
- 7. IT Efficiencies

Out of Scope for the TAC (for now)

- 1. Vertical Solutions (End User / SIG Program)
 - a. At Board/SPC level



LF Edge TAC - Focus Areas for 2021: Continued Discussion

- One idea raised was for deeper (technical) solution briefs around Use Cases and Deployments
 - > Would require commitment (volunteers) from the TAC, Projects, as well as the SPC
- (from prior discussion) White Papers
 - > LF Edge level or Project level?
 - General (2020 introduced taxonomy/Projects) or Specific? (e.g. Security, Telemetry)
 - > Who would be the audience?
 - Post publishing, vehicle for feedback? Success metrics?
- Other initiatives?
 - > Open Edge Services Catalog creation and cross-project support
 - > Common way to document APIs for all the projects



Project Resources: Getting Started Checklist

- 1. https://wiki.lfedge.org/display/LE/Technical+Project+Getting+Started+Checklist
- 2. Best Practices Guide for new, and existing, LF Edge Projects to define/refine/enhance their Project Management
- 3. Will be sent to Project TSC Leads for additional input / examples
- 4. Welcome feedback in the TAC as well



CII Best Practices Badge

- Identifies a set of best practices for OSS projects, focusing on security
- > Provides a mechanism for projects to self-certify that they meet these criteria
 - > Automation helps & prevents some false answers
- > Full presentation here:
 - https://github.com/coreinfrastructure/best-practices-badge/blob/master/doc/cii-bp-badge-intro.pptx
- Website where projects can receive a badge here:
 - https://bestpractices.coreinfrastructure.org
- EdgeX Foundry, Home Edge and Open Horizon badging already in progress!
 - https://bestpractices.coreinfrastructure.org/en/projects/1226
 - https://bestpractices.coreinfrastructure.org/en/projects/4336
 - https://bestpractices.coreinfrastructure.org/en/projects/4300
- LF Edge Wiki tracks badge progress here: https://wiki.lfedge.org/
- > Proposal: All LF Edge projects be encouraged to get a CII Best Practices badge



State of the Edge - 2021 Report - Postcards from the Edge

And Now, The Time Has Come: 5G and the Edge

We're at a watershed moment in the evolution 5G, the "put-up or shut-up" moment when operators are assessing the commercial value to justify their investment in a 5G buildout. This is what always happens in the marketing and investment dance c a new cellular generation.

Recent research concludes that the full value of 50 is still being discovered, with select operators like SK Telecom aggressively exploring edge service that can deliver outsized value and demand premium.



Geoff Hollingworth CMO, MobiledgeX

Add Your Voice: info@stateoftheedge.com

Who Will Build and Pay for the Edge?

The Data Layer Challenge at the Rapidly Evolving Edge

In the early days of the cloud, visionaries predicted that enterprise infrastructure would quickly migrate to few large cloud providers. Unfortunately, the early cloud hype got ahead of reality—because public cloud faces a huge issue it can't solve on its own: latency. The edge is developing quickly, but the initial emphasis has been on providing compute capabilities, with little thought given to storage.



Ellen Rubin CEO, Clear Sky Data ed and now the special-IoT and

e edge efficient nelm of ing and able to



Monica Paolini Principal at Senza Fili





State of the Edge - 2021 Report

LF Edge Project Asks

1. Designate a Liaison

a. It would be ideal if the each Project could assign a volunteer to be the primary liaison with State of the Edge. This would not require much work, just a conduit for info and coordination. Intro to me directly via email.

2. Align with the Glossary

a. Now that LF Edge has adopted clear terminology at the top level, we want to work towards aligning the project publications and documentation. Ideally, each Project would formally adopt the <u>Open Glossary of Edge Computing</u> and ask all its writers and contributors to use it as a style guide.

3. Landscape.

a. There are probably many LF Edge contributing and supporting companies who have not yet been added to the LF Edge Landscape. I can help with this process, but I need .SVG logos. This is free advertising so it should be easy to incent folks.

4. Postcards from the Edge

a. Like last year, the 2021 State of the Edge will include outside contributions of 500-1000 words. These need to be educational and not advertorial, but the author and their company will get credit. We will publish an abstract in the 2021 report and run the full essay on the blog.

5. Project Update for State of the Edge

a. We plan to include a 2-3 paragraph "state of" for each of the LF Edge projects. Please assign somebody to this. We will want to see drafts in early November.

6. Consider fielding and editor

a. If a Project/Member wishes to have input on the 2021 State of the Edge report, the best way is to find someone willing to be a section editor. This requires reading and commenting on at least one chapter of the 2021 guide, and this will need to be done under fairly tight deadline in November.





Pushed to Next Meeting

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