



International Network Generations Roadmap

-2021 Edition-

Edge Automation Platform



An IEEE 5G and Beyond Technology Roadmap
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This edition of the INGR is dedicated to the memory of Earl McCune Jr., who left us tragically and too soon on 27 May 2020. Earl was a microwave/RF guru, brilliant technologist, major industry/IEEE contributor, global visionary, keen skeptic, and all around fantastic human being. He was a major contributor to the INGR's early work on energy efficiency, millimeter-wave, and hardware. He worked for a technologically advanced yet more energy efficient world, and the contents of the INGR are a tribute to that vision. Rest in peace, Earl!



Table of Contents

1. Introduction	1
1.1. Edge Automation Platform Framework (EAPF) Roadmap	1
2. Working Group Vision	3
2.1. Scope of Working Group Effort	7
2.2. Linkages and Stakeholders	8
3. Today's Landscape	11
3.1. Current State of Technology and Research	11
3.1.1. Autonomous Driving Use Case	11
3.1.2. Gaming Services	12
3.1.3. Industrial IoT	12
3.1.4. MEC Light Edge MEC use case	13
3.1.5. Edge Management Models (EMM) for Applications & Systems	14
3.1.6. Edge Automations Platform Framework (EAPF 2020) deployment scenarios	17
3.1.6.1. Control & Management Planes (CP/MP):	17
3.1.7. Workloads, OS-Containers and Process Containers	19
3.2. Drivers and Technology Targets	19
3.2.1. Heterogeneous Computing Support	20
4. Future State (2031)	23
4.1. Vision of Future Technology	23
4.1.1. MEC & the Green MEC (Energy Efficient)	23
4.1.2. Serverless Edge Functions & Emergence of Vertical Domains	24
4.1.3. Consumer Electronics and Device Edge	25
4.2. Mobile Edge Architectural Framework	25
4.2.1. Future of Compute & Storage Offload	27
4.2.1.1. Compute offloading from device to edge	27
4.2.1.2. Compute offloading from Edge to Cloud	28
4.2.1.3. Storage offloading from edge for Big Data Analytics	28
4.2.2. Edge as a Service	28
4.2.2.1. Use-cases and implementation tools:	29
4.2.3. Edge Computing based on virtualization & VMs:	31
4.2.4. Service Mesh (CNCF) - Cloud-Native L2/L3 Service Mesh	32
4.2.4.1. Open Policy Agent & Congres	32
4.2.5. Training & Deployments of Inference Models at the edge	33
5. Needs, Challenges, and Enablers and Potential Solutions	35
5.1. Requirements to Enable Edge Cloud Platform	37
5.2. Top level needs, Challenges, and Solutions	38
5.2.1. Need #1 Platform Standardization	39
5.2.2. Need #2 Application Standardization at the Edge	40
5.2.3. Need #3 User Expectations from Service and Operations	40
5.2.4. Need #4 Security at the Edge	40
5.2.5. Need #5 Support for Heterogeneous hardware	41
5.2.6. Need #6 Hybrid Cloud – 'Edge Service'	41
5.2.7. Need #7 Intelligent Client Devices	42
5.3. Security at the Edge - INGR.EAPF.Security.2020	42
5.3.1. One size does not fit all	42

5.3.2.	Orchestration of Edge Service Cognizant Security (e.g., Slice security, personalized security)	42
5.3.3.	Driving and ensuring security down to the lowest possible elemental functional entities	42
5.3.4.	Real time Transparency	43
5.3.5.	Must win the Cat-and-Mouse game	43
5.4.	FCAPS for Edge Microservices	43
5.4.1.	Sidecar for “Faster” Infrastructure	43
5.4.2.	Distributed & Localized Availability	43
5.4.3.	Rethink Microservice Based Reliability	43
5.4.4.	Observability Driving Assurance	44
6.	Conclusions and Recommendations	44
6.1.	Summary of Conclusions	44
6.2.	Working Group Recommendations	45
6.2.1.	Future Work	45
7.	Contributors	47
8.	References	48
9.	Acronyms/abbreviations	50
10.	Appendices	53
10.1.	Appendix A: Cloud & Edge Computing Market	53
10.2.	Appendix B: Use case addendums	55
10.2.1.	Autonomous Vehicle Edge Computing Reference Architecture	55
10.3.	Appendix C: oneAPI Library addendum	55
10.4.	Appendix D: Security addendum	57

List of Tables

Table 1.	Cross-working group linkages and roadmap	8
Table 2.	Overall Needs of Edge Platform & Service Automation	37
Table 3.	Top needs of 10-year vision, challenges and some possible solutions.	38
Table 4.	Edge Computing Global Spending Report	53
Table 5.	Edge Computing Spending Share by Geography (IDC 2019-29024)	54
Table 6.	Edge Computing Spending Share by Professional Service & Technology (IDC 2019-29024).	54
Table 7.	API Libraries	56
Table 8.	Security Challenges and Possible Approaches	57

List of Figures

Figure 1. IEEE INGR EAP framework (EAPF 2020) for ESP Framework (ESPF 2021)	4
Figure 2. IEEE Edge Automation Platform Framework (INGR.EAPF) with emerging IEEE Edge Native Service (ENS) across Edge to Cloud continuum as part of Edge Service Platform Framework (INGR.ESPF).	6
Figure 3. Reference Architecture of the computing system on autonomous vehicles	12
Figure 4. The LightSystem Level Architecture.	13
Figure 5. Heterogeneous 4G/5G network (Non-StandAlone) setup	14
Figure 6. EAP Models 1-7 (INGR.EAPF reserved 8-100, add 101+ as user type models) (Containers or VM the Model applies)	15
Figure 7. ERD for Control Plane Nodes & Workload Nodes in different Clusters.	16
Figure 8. Kubernetes Control Plane (CP), Management Plane(MP) and Workload Clusters for edge.	17
Figure 9. MEC key business drivers	20
Figure 10. 1-API enabling Heterogeneous Infrastructure Compute Unified Devices	21
Figure 11. 1-API Languages & Libraries	22
Figure 12. The LightEdge Architecture in a 5G SA deployment.	26
Figure 13. End-to-end 5G SA Architecture with LightEdge(Edge)	27
Figure 14. Thematic diagram for edge processing as Service [12**]	29
Figure 15. URLLC/e-URLLC dependent Edge use cases [12**]	30
Figure 16. Edge dependent radio access interface vision [12**]	31
Figure 17. Open Policy Agent based Distributed Policy deployments for the Edge Services	33
Figure 18. Training & Deployments of Inference Models at the edge	34
Figure 19. Edge Data Collection with OpenTelemetry for Infrastructure & Applications	36

ABSTRACT

The platform for edge and its automation is proposed as Edge Automation Platform Framework (EAPF 2020) and this covers Platform to Infrastructure standardization as underlay optimizations. The Service to run on edge to cloud continuum is proposed as Edge Service Platform Framework (ESPF 2021) which will cover the edge service optimizations for low sub millisecond latencies and higher bandwidth and capacities for 5G/IoT/WiFi6 and beyond.

Proposed the Edge Automation Platform Framework (EAPF) 2020

Edge Platform includes the necessary Infrastructure and Platform framework to be able to support the constraints of Infrastructure traits and tolerances. Simple abstractions of Compute, Networking and Storage have stood the test of time & form factors from Bare Metal, VMs to containers. Standardizing Infrastructure abstractions as Kubernetes nodes & clusters has led to the concept of Serverless Platform as the next generation Edge Platform Framework. The evolving concept of Automating the Edge Platform as proposed in the 2020 release as part of EAP Framework (EAPF) 2021.

Proposed Edge Service Platform Framework (ESPF) 2021

Edge Service includes the necessary Platform and Applications that are distributed and delivered to consumers and enterprises. The requirements to support privacy, security and proximity functionality for location-based delivery of services leads to touch point of edges all over from on-prem, IoT Gateways, light poles, small cells, macro cells, fronthaul, Micro Data Centers, midhaul, central office, provider edge with microservices architecture, loosely coupled composable services from service catalogues across the edge to cloud continuum.

Essentially, we are replacing the first edition of EAP with this new edition of serverless EAPF (2020) & distributed service ESPF (2021). One can oversimplify it as Platform to Infrastructure representing EAP Framework and Platform to Service representing ESP Framework.

The era of domain specific services needs a new distributed Edge Service Platform Framework (ESPF) that is able to support different models of Management Plane (MP), Control Plane (CP) and Data aggregation plane (DP) and Edge User Plane Functions (EUPF) to support serverless Edge Native Functions (ENF) & services (ENS) of different domains. Moving away from hyperconvergence cloud Infrastructure to serverless form is fueled by federated distribution of service functions, service mesh, service chains and block chains with AI/ML models and feedback loop-based optimizations. Besides Infrastructure domain acceleration through parallel processing, in-line encryption, decryption, load balancing across heterogeneous edges & clouds add to the serverless services. Containerization and Blockchain are emerging to provide futuristic edge native solutions. We are currently evaluating requirements on ESPF. We plan to scope emerging Blockchain (BC), Web 3.0 and other elements to support real time, domain specific edge services with multi-RAT/Multi-access Edge computing (MEC), WiFi6/Green Services with Crypto based security in 2021 editions. We have several linkages within INGR to drive the efforts with collaboration and support.

Key words: 5G, AIML, BC, CNF, CP, DP, EAPF, ENF, ENS, ESPF, EUPF, INGR, IOT, MEC, RAT, UP

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