Topics

› Introduction to LF Networking
› Why 5G Super Blueprints
› What is a Super Blueprint - Details
› Current Status and next steps
Introduction to LFN
We are behind some of the most critical projects in the world

<table>
<thead>
<tr>
<th>Category</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security</td>
<td>Let's Encrypt, CORE INFRASTRUCTURE INITIATIVE, OpenSSF, Falco, rtp, SEI, CENIC, OPEN SECURITY FOUNDATION, CENIC, DANOS</td>
</tr>
<tr>
<td>Networking</td>
<td>ONAP, OPEN DAYLIGHT, io, Anuket, SONIC, DDENT, DANOS</td>
</tr>
<tr>
<td>Cloud</td>
<td>CLOUD NATIVE COMPUTING FOUNDATION, Kubernetes, Argo, Envoy, KUDOS, Crossplane, CLOUD FOUNDARY</td>
</tr>
<tr>
<td>Automotive</td>
<td>AUTOMOTIVE GRADE LINUX, ELISA, KernelCI</td>
</tr>
<tr>
<td>Blockchain</td>
<td>Hyperledger, Fabric, Hyperledger Sawtooth, Accord Project, ERGO, DIF</td>
</tr>
<tr>
<td>Edge/IoT</td>
<td>LF Edge, Yocto Project, Zephyr, ACRN, Dronecode, Fledge, OpenEEW</td>
</tr>
<tr>
<td>Web</td>
<td>Node.js, OpenJS Foundation, GraphQL, Appium, jQuery, React, DOJO, ESLint</td>
</tr>
<tr>
<td>AI</td>
<td>LF AI, ONNX, Delta Lake, ForestFlow, JanusGraph, Kepler.gl, Ludwig</td>
</tr>
<tr>
<td>Film</td>
<td>ASWF, OpenColorIO, OpenVDB, OpenEXR, OpenEXR, OpenEXR, OpenStdLang</td>
</tr>
<tr>
<td>CI/CD</td>
<td>CD, Jenkins, Spinnaker, Tekton, Tern, StackStorm, Vitess, etcd, SPIRE</td>
</tr>
<tr>
<td>Hardware</td>
<td>RISC-V, OpenPOWER, CHIPS Alliance, Unimatrix, 3MF Consortium</td>
</tr>
<tr>
<td>Standards</td>
<td>Alliance for Open Media, OpenChain, Community Data License Agreement, Joint Development Foundation, Cloud Information Model, Chaos, Open Manufacturing Platform</td>
</tr>
</tbody>
</table>
LF Networking

The largest set of open source networking projects in the world - formed by a broad industry coalition - with the goal of fostering a commercial-ready networking ecosystem.
Our Mission

Drive an open source ecosystem that revolutionizes the movement or communication of data on a network - including its data plane, control plane, analytic, orchestration, and automation technologies - for enterprise, cloud, and carrier network constituents.
The World of Open Source Software Has Shifted

A collage of independent projects is no longer the driving commercial force.

Today, leading organizations view open source software as a disruptive ecosystem.
Compelling Network Ecosystem Growth

- 856,000+ code commits in the last 3 years
- 23.8% Growth in Code Commits
- 7,000+ Code Contributors
Why 5G Super Blueprints
End to End Open Source Software Collaboration with LFN

Mobile

Residential

SMB/ROBO

Enterprise & IIOT

Carrier Access

Carrier Core

Public Cloud

Private Cloud

Apps/Internet/Web

xNFs

magma

L3AF

Network Operating Systems (DENT, SONiC..)

eg Google, Microsoft, AWS, IBM, Huawei, Alibaba, Baidu, Tencent..

* Sample projects only
Vertical Market Adoption of End to End Open Source Software

**OPEN NETWORKING, EDGE AND IOT MARKET ADOPTION**

<table>
<thead>
<tr>
<th>Service Providers</th>
<th>Enterprise Networking</th>
<th>End Users, Governments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Built on end to end open source 5G &amp; edge</td>
<td>1. Private Networks 5G/LTE</td>
<td>1. Built on Open Source projects</td>
</tr>
<tr>
<td>2. Developing countries with 5G and edge</td>
<td>2. Workloads across Multi-clouds</td>
<td>2. Open Solutions and Blueprints</td>
</tr>
</tbody>
</table>

**5G SUPER BLUEPRINTS BUILT ON END TO END OPEN SOURCE PROJECTS**

- ORAN Alliance
- ONAP
- HOME EDGE
- Akraino
- EdgeX Foundry
- DPDK
- Fledge
- Anuket
- Magma
Re-Aggregation a key requirement beyond Open Projects

Secure Open Source 5G Gains Momentum as Community Focuses on Re-aggregation, with 5G Super-Blueprints & New Members

- LFN Community publishes white paper highlighting cybersecurity efforts
- Telecom, Cloud and Enterprise aligning solutions with 5G Super Blue Print spanning projects like ONAP, Anuket, EMCO, Magma, ORAN-SC and more as Enterprise eBFP project L3AF is inducted into LF Networking
- ATOS, GenXComm, Keysight Technologies and Telaverge Communications join LFN as Silver members

SAN FRANCISCO, April 12, 2022 – LF Networking, which facilitates collaboration and operational excellence across open source networking projects, today announced continued momentum focused on re-aggregation, with updates to security, 5G blueprints, and the addition of four new Silver members: ATOS, GenXComm, Keysight Technologies, and Telaverge Communications.

- LF Networking leading the security challenge for Open Source Projects
- LFN Growth supported by new members & increased collaboration with Standards, Alliances and Foundations
- 5G Super Blueprints become the anchor initiative for end user deployment momentum including US Gov
- Major Service Providers, Services, Infrastructure & Network Function Vendors behind this global initiative.
What is a 5G Super Blueprint
LFN 5G SBP Overview - 10000 foot view

Enterprises/Industry 4.0

US Gov+  Global Telcos  Cloud Providers

Work Loads, Apps, xNFs based on end users

Anchor Use cases - uLLC, eMBB, Voice, Network Slice, Private Network, Industry 4.0 by Verticals…

Platform Interop and Integration - End to End (5G SBP)

WHO PARTICIPATES

Vendors/SI - Proprietary

Generic: Community + 5G SBP

LFN 5G Super Blue Print
Open Ecosystem players
What is the 5G Super Blueprint?

Motivation:
› Provide a collaboration platform for building important technology solutions related to 5G networks
› Blueprint, prototype and integrate open source software to address real-world use cases
› Bring together multiple projects, communities, companies and end-users to collectively develop the necessary solutions

What is a Super Blueprint?
› It is a community-driven integration/illustration of multiple open source initiatives coming together to show end-to-end use cases demonstrating implementation architectures for end users.
› 5G Super Blueprint is just one example
   › This kind of initiative allows open contribution for more use cases across Enterprise, Cloud and Telecom ecosystems
What a 5G Super Blueprint is Not

› It is not a product
› It is not a project in the sense that ONAP, MAGMA, Akraino, Anuket, K8s, etc., are top level chartered projects; it is a proof of concept and integration across multiple open source projects and multiple company products of how to create something end-to-end using open source.
› It is not a commercial distro.
› It does not prove-out all non-functional requirements such as security, reliability, etc., unless the community adds a use case and resources for that specific purpose.
› It is not an endorsement of any specific participating organization; it is an exercise in building a solution.
OPS-5G Engagement with the 5G SBP

The 5G SBP community and OPS-5G co-contribute to maintain alignment where possible. Avenues of collaboration with respect to Use Case, Functionality Development, and Integrations:

› Secure Network Slicing, including Transport Slicing
› Distributed Denial-of-Service (DDoS) Mitigation
› Edge Computing Support:
  › Remote Attestation at the Edge
  › Traffic Routing at the Edge
  › Packet Filtering at the Edge
# Open Source foundations + Standards + Alliances 2022

## Open Source Software Foundations

- ✓ Linux Foundation & its sub-foundations (LFN, LF Edge, CNCF, Magma, ORAN, LF Energy...)
- ✓ Open Infrastructure Foundation (Openstack, Magma)
- ✓ Eclipse Foundation (Edge)
- ● Others (Single Vendor/Open)

## Standards/Specs/Ref Arch/API

- ✓ GSMA (LFN, OPG, CAMARA)
- ✓ ETSI (Edge, Core)
- ✓ 3GPP
- ✓ ORAN Alliance (RAN)
- ✓ NGMN (Disagg, Green, 6G)
- ✓ TMForum (API)
- ✓ MEF (API)
  - TIP (Open hardware)
  - IETF (Lower Layers)
- ✓ OCP (Co-Design hardware-software)

## Open Alliances & Consortiums

- ✓ AECC
- ✓ IIC
- ✓ Digital Twin Consortium
- ✓ IOTA Foundation
- ✓ Open-IX
- ✓ Several Vertical specific

---

**Collaboration has increased significantly across foundations, SDOs, Alliances and Consortiums**
5G Super Blueprint Updates
Nov 2022
5G Cloud Native Blueprint Network Architecture
**Key Project Integrations**

- [ONAP](#) OPEN DAYLIGHT: **COMPLETE**
- Magma 1.6: **COMPLETE**
- EMCO: **COMPLETE**
- Anuket: **COMPLETE**
- KubeRef RI2: **COMPLETE**
- O-RAN Software Community (SC): **IN PROGRESS**
- CU/DU Emulation: **IN PROGRESS**
- EMCO: **COMPLETE**

**Case Study Under Development**

*5G Super Blueprint Commercial Engagement:* CapGemini with Aarna Networks applied the 5G Super Blueprint – including EMCO and ONAP – in an equipment provider customer engagement in Japan or pre-production testing. Stay tuned!
Nov 2022 Updates

› **ONE Summit Seattle:**
  › The 5G SBP community is currently focused on building a PoC to demonstrate a factory floor visual inspection environment with hard hat detection (safety) using static transport slicing showing ULLC and eMBB Use Cases.
  › The PoC includes Free5GC mobile packet network core
  › Visual inspection is achieved using IBM visual inspection models, and IBM AI software based on Open Horizon and Secure Device Onboard

› **Lab Resources:**
  › Kaloom has committed their lab in Montreal on a permanent basis to the 5G Super Blueprint
  › Other lab resources; University of New Hampshire, Wavelabs (Hyderabad India)

› **Roadmap:**
  › Core diversity (SD-Core, Open 5GS,OAI)
  › Massive IoT
  › Security and Authentication - Remote Device Attestation at the Edge
  › Inclusion of ORAN-SC
  › Dynamic Slicing
  › LF Edge Use Cases
Establishment of Workingroups

› Workgroup 1 – Continued Infrastructure & Technology Innovation & Buildout
  › Build and evolve on current infrastructure
  › Build on technology innovation and methods
  › Documentation may include; packaging of images, hardware specs, developer notes, best practices
  › The intent is that Workgroup 1 deliverables are consumable packages that end users can bring onto their environment and build upon. For example; ONAP orchestrating SD-Core

› Workgroup 2 - Expansion with Parallel & Sister LF Communities
  › Enhanced Mobile Broadband (eMBB)
  › Ultra-Reliable Low Latency Communications (URLLC)
  › Massive Machine Type Communication (mMTC)
  › Expansion with Parallel & Sister LF Communities:
    › LF Edge Use Cases
    › LF Energy Use Cases
    › LF Health Use Cases

Workgroup 2 current work item: 5G SBP Use Case - Factory Floor Visual Inspection - ONE Summit Proof of Concept (November 2022)
www.linuxfoundation.org