Nephio Project
Induction
Sept. 13, 2023
Nephio is seeking induction at the “Graduated” level

- We believe in good faith there is adequate justification for the request based upon
  - The lifecycle criteria for Sandbox and Incubation levels already being fully met
  - Most Graduated criteria already fully met and work in progress for the few exceptions

- Factors we ask you to consider during this review
  - Project TSC operational for > a year
  - Over 1,400 commits post seed-code drop
  - Processes mature and stable
  - Large & Diverse ecosystem of participation
  - 3 in-person events (2X summits + 1 meet-up) have drawn significant attendees
  - 1st major release recently delivered
The framework used for our submission

- LFN has never had an incoming Project request a “skip-tier” induction
- Without prior examples to look at, a framework was necessary
- Partnered with LFN Staff on the creation of a wiki page which describes our thought process
- The framework we used is here: https://wiki.lfnetworking.org/x/yoAKBg
Nephio’s Mission

The mission of the Project is to deliver carrier-grade, simple, open, Kubernetes-based cloud-native intent automation, and common automation templates that materially simplify the deployment and management of multi-vendor cloud infrastructure and network functions across large scale edge deployments. The project seeks to enable faster onboarding of network functions to production including provisioning of underlying cloud infrastructure with a true cloud-native approach, and reduces costs of adoption of cloud and network infrastructure.
Nephio’s Vitals

- **Project Creation Date:** April 12, 2022
- **TSC Established:** May 2022 (top-level technical decision-making body)
- **Technical Charter Adopted:** June 22, 2022
- **Project License:** Apache 2.0
- **Community size:** 500 Members (based on “Main” mailing list)
- **Contributors:** ~90 past 12 months
Nephio Timeline

70+ organizations

14K social media reach

2022
April
May
June
August
November
December
2023
Feb
June
Aug

Nephio moves to the Linux Foundation Technical Steering Committee Established

Developer Summit I Sunnyvale, CA
Special Interest Groups Established

Developer Summit II Seattle, WA

Nephio Meetup India

Nephio LFN D&TF Sessions

Nephio R1 release

500 event attendees

2 major in-person events

500 event attendees

2 major in-person events

500 event attendees

2 major in-person events

500 event attendees

2 major in-person events

500 event attendees

2 major in-person events

500 event attendees

2 major in-person events

500 event attendees

2 major in-person events

500 event attendees

2 major in-person events

500 event attendees

2 major in-person events

500 event attendees

2 major in-person events

500 event attendees

2 major in-person events
Project Overview
Lack of right technology: Challenges

**Kubernetes is not enhanced enough to support Network Function automation:**

- Kubernetes only manages basic compute/network/storage whereas NFs have demands beyond standard Kubernetes such as existing Pod extensions: Multus, SR-IOV support, DPDK, etc.
- In addition NFs and cloud-infra have more complex lifecycle management requirements.
- Enterprises rely on Kubernetes based automation for workload but Telcos rely on traditional management functions (e.g NFVO) outside of Kubernetes to manage workloads, which is not optimal for workload reconciliation.

**Infrastructure-as-Code falls short at many ends:**

- The existing automation to deploy network functions on top of K8s mostly uses Infrastructure-as-Code (e.g Helm), which has many limitations, e.g.
  - Complex templates
  - Difficult to read and test
  - Limited re-use, end up with huge lists of values that need setting
  - Not composeable - cannot handle complex sets of applications built from reusable components
  - Non-declarative and lacking vendor neutral templates
Nephio Functional Building blocks

**Orchestration Cluster**

User Interaction Layer (APIs/GUI/CLI) with KRM / CaD Templates

- **Intent Design**
  - Intent Design Studio
    - Package Authoring, Publishing, Catalog
  - Intent Specialization
    - Package Instantiation, Customization
  - Intent Validation
    - Policy, Resource, Consistency Checks

- **Intent Deployment**
  - Cluster Selection
    - Package Cluster Placement, Specialization
  - Cross-Cluster Dependencies
    - Package Delivery Order, Status
  - Intent Delivery
    - Package Distribution, Progressive Rollout

- **Control Loop**
  - Automated Intent Revisions
  - Metric Aggregation
  - Status Aggregation

**Cloud Mgmt Cluster**

- Intent Actuation
  - Local Policy Validation
  - Package Ingestion
  - Cross-Resource Dependencies
  - Intent Reconciliation
  - Resource Actuation

KRM - Kubernetes Resource model
CaD - Configuration as Data
Nephio currently operates under its original “Start-Up Period” governance as defined in the Charter

- The TSC has the ability to evolve the Project’s governance model at this time
- The community’s primary focus thus far has been the delivery of the 1st release
- 3 additional companies have been inducted into the TSC post release - contribution based
- Securing LFN membership is the TSC’s active priority
- Establishing the TSC’s “Steady-State” composition will be next

Project Roles

- TSC members, SIG members, Committers & Contributors

How Project Roles are filled

- Defined in the Charter, and CONTRIBUTORS.md file on GitHub
- SIG Chair/V-Chair selection and Contributor -> Committer promotion are handled via meritocratic votes
Project Governance (2 of 2)

- **How people are removed from Project Roles**
  - Under the Start-Up Period the TSC Chair and Vice Chair serve until their resignation or replacement by the TSC
  - Establishing the lifecycle(s) of other Project Roles is provided for in the Charter, but none are currently defined

- **Who currently fills all project roles**
  - [CONTRIBUTORS.md](https://wiki.nephio.org/x/wONKAQ)

- **How disputes are definitively resolved**
  - Nephio’s Charter contains the LF’s standard language in Section 3: *Consensus -> TSC Vote -> Series Manager*

- **Community Meetings**
  - TSC [https://wiki.nephio.org/x/wONKAQ](https://wiki.nephio.org/x/wONKAQ)
  - SIGs [https://wiki.nephio.org/display/HOME/calendars](https://wiki.nephio.org/display/HOME/calendars)
<table>
<thead>
<tr>
<th>TSC MEMBERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandeep Sharma</td>
</tr>
<tr>
<td>Raj Panchapakesan</td>
</tr>
<tr>
<td>Erhan Lokman</td>
</tr>
<tr>
<td>Daniel Bernier</td>
</tr>
<tr>
<td>Sandip Sarkar</td>
</tr>
<tr>
<td>Eric Gaudet</td>
</tr>
</tbody>
</table>

**Nepho**
Nephio Special Interest Groups

SIG 1: Network Architecture
Chair: Sana Tariq (Telus)
Vice-chair: Kaushik Bhandankar (Google)
Specifications and Requirements

SIG 2: Automation
Chair: John Belamaric (Google)
Vice-chair: Wim Henderickx (Nokia)
CRDs, Operators, and Related Tooling

SIG 3: Release
Chair: Stephen Wong (Google)
Vice-chair: Tina Tsou (ARM)
Reference Implementation, Packaging, Installation

SIG 4: Security
In early discussions
Security by Design

The Linux Foundation
## Nephio Infrastructure Tooling

<table>
<thead>
<tr>
<th>Functional Area</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="https://nephio.org/">https://nephio.org/</a></td>
</tr>
<tr>
<td>Wiki</td>
<td>wiki.nephio.org</td>
</tr>
<tr>
<td>Code Repos</td>
<td><a href="https://github.com/nephio-project">https://github.com/nephio-project</a></td>
</tr>
<tr>
<td>Bug Tracking</td>
<td><a href="https://github.com/nephio-project/nephio/issues">https://github.com/nephio-project/nephio/issues</a></td>
</tr>
<tr>
<td>Code Review</td>
<td></td>
</tr>
<tr>
<td>Documentation</td>
<td><a href="https://github.com/nephio-project/docs">https://github.com/nephio-project/docs</a></td>
</tr>
<tr>
<td>CI/CD</td>
<td><a href="https://github.com/nephio-project/nephio/actions">https://github.com/nephio-project/nephio/actions</a></td>
</tr>
<tr>
<td>Mailing Lists</td>
<td><a href="https://lists.nephio.org/g/main">https://lists.nephio.org/g/main</a></td>
</tr>
<tr>
<td>Collaboration tool</td>
<td>nephio.slack.com</td>
</tr>
</tbody>
</table>
Release Resources

- **Release Plan:**
  - Seed Code Availability <Release Date>
    - [https://github.com/nephio-project](https://github.com/nephio-project)
  - Release Schedule:
    - R1- June 29, 2023
    - R2 - TBD

- **Release Overview**
- **Release Notes**
- **Source Code**
- **Docker hub** artifacts
- **User guide**
- **Install Guide**
- Code scans
  - [Gosec](https://gosec.dev) report
  - [Scancode](https://www.oss-index.com) report for licenses
  - [Fossology](https://fossology.org) report

Watch Nephio R1 demo:
Nephio Aspirational Roadmap
Nephio: Looking beyond R1

**User Stories**
- Multi-cloud
- Multi-vendor NFs
- Multi-domain (RAN, Wireline, Transport)
- Day 0 focus
- Higher-level constructs (e.g. LCM for slices)
- Scalability (large scale deployments)

**CRD/Operators**
- Establish CRD schema
- Operators SDK
- Helm & YANG/TOSCA support
- Compliance and certification program

**Control-Plane**
- UI: GUI & APIs
- UI: Design Studio
- Integration APIs to MSO, Inventory systems, BSS
Nephio as a Graduated tier Project
Our assessment

● Recapping: We believe in good faith there is adequate justification for the request based upon
  ○ The lifecycle criteria for Sandbox and Incubation levels already being fully met
  ○ Most of the Graduated criteria is also fully met with work in progress on the exceptions

● We benchmarked Nephio’s current state against the lifecycle criteria, not against other Graduated tier Projects in LFN - but feel that we may be ahead in

● Framework used: https://wiki.lfnetworking.org/x/yoAKBg
LFX Insights (V3) 2023 YTD - Code Contributions

MONTHLY ACTIVE CONTRIBUTORS

- United States: 3218 Activities - 57.51%
- Belgium: 1162 Activities - 21.12%
- India: 436 Activities - 7.79%
- Hungary: 265 Activities - 4.74%
- Ireland: 134 Activities - 2.30%
- United Kingdom: 133 Activities - 2.38%
- Netherlands: 92 Activities - 1.64%
- France: 57 Activities - 1.02%
- Canada: 55 Activities - 0.98%
- Poland: 17 Activities - 0.3%
- Germany: 3 Activities - 0.05%
- Taiwan, Province Of China: 2 Activities - 0.04%
- Greece: 1 Activity - 0.02%
- Israel: 1 Activity - 0.02%

MONTHLY ACTIVE ORGANIZATIONS

- Total Active Organizations: 15
- Returning Organizations: 2

MONTHLY ACTIVITIES

- Activities: 2500 - 0
## Sandbox → Incubation → Graduated

<table>
<thead>
<tr>
<th></th>
<th>Sandbox</th>
<th>Incubation</th>
<th>Graduated</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code scanning</td>
<td>Intake</td>
<td>Ad-Hoc</td>
<td>Regular</td>
<td>silence</td>
</tr>
<tr>
<td>Coding standards</td>
<td>Loose</td>
<td>Moderate</td>
<td>Strong</td>
<td>silence</td>
</tr>
<tr>
<td>PTL lifecycle</td>
<td>None</td>
<td>Required</td>
<td>Required</td>
<td>silence</td>
</tr>
<tr>
<td>Sub Project Lifecycle</td>
<td>None</td>
<td>Partial</td>
<td>Full</td>
<td>Archiving model not yet set - low priority - will be a release 2 consideration</td>
</tr>
<tr>
<td>TSC Membership</td>
<td>Appointed</td>
<td>Mixed</td>
<td>Meritocracy</td>
<td>Intent is to move to a fully elected meritocracy by year’s end</td>
</tr>
<tr>
<td>Tech-Doc</td>
<td>Build</td>
<td>+ Deploy</td>
<td>+debug &amp; upgrade</td>
<td>1st release - therefore no upgrade docs needed until 2nd release</td>
</tr>
<tr>
<td>Contrib. onboarding Doc</td>
<td>None</td>
<td>Simple</td>
<td>Detailed</td>
<td></td>
</tr>
<tr>
<td>Release Mgmt</td>
<td>None</td>
<td>Defined</td>
<td>Followed</td>
<td>silence</td>
</tr>
<tr>
<td>Ci/Cd automation</td>
<td>Manual</td>
<td>Some aspects</td>
<td>Most aspects</td>
<td>silence</td>
</tr>
<tr>
<td>Adoption</td>
<td>None</td>
<td>None</td>
<td>1 or more implementations</td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td>No focus</td>
<td>Vulnerability reporting</td>
<td>80% to OpenSSF Passing</td>
<td>PSIRT group in place, Security SIG under consideration. OpenSSF badge process is WIP. See no blockers to meeting the 80% threshold by EoY</td>
</tr>
</tbody>
</table>

Framework used: [https://wiki.lfnetworking.org/x/yoAKBg](https://wiki.lfnetworking.org/x/yoAKBg)
In Summary:

- Significant interest expressed by LFN members in having Nephio as an LFN Project
  - 2/3 of the TSC seats represent current LFN members
  - 30% of the TSC seats represent LFN Platinum members

- Project has been operational for well over a year

- Still some organizational tuning to do, but most processes mature and stable

- Robust number of contributors

- Large & Diverse ecosystem

- 1st major release delivered

- Already pursuing security best practices
Thank You! - Q&A
Open & Follow-up Items