Our Industry's Billion$^+$ Dollar Puzzle

(Discussed by Guru Parulkar earlier today)

The Puzzle We Need to Solve!

Access and Edge Platform
POC/Trial Quality

A portfolio of Services/VNFs
Connectivity, Core, and Edge Cloud

An Open Source Software Stack
XOS (Service OS), ONOS (Network OS),
VOLTHA (OLT), xRAN, Stratum (Switch OS)

OLT   RAN   Switch

White Box
Devices

Many operators want to deploy solutions based on this platform and looking for supply-chain partners to productize and commercially support
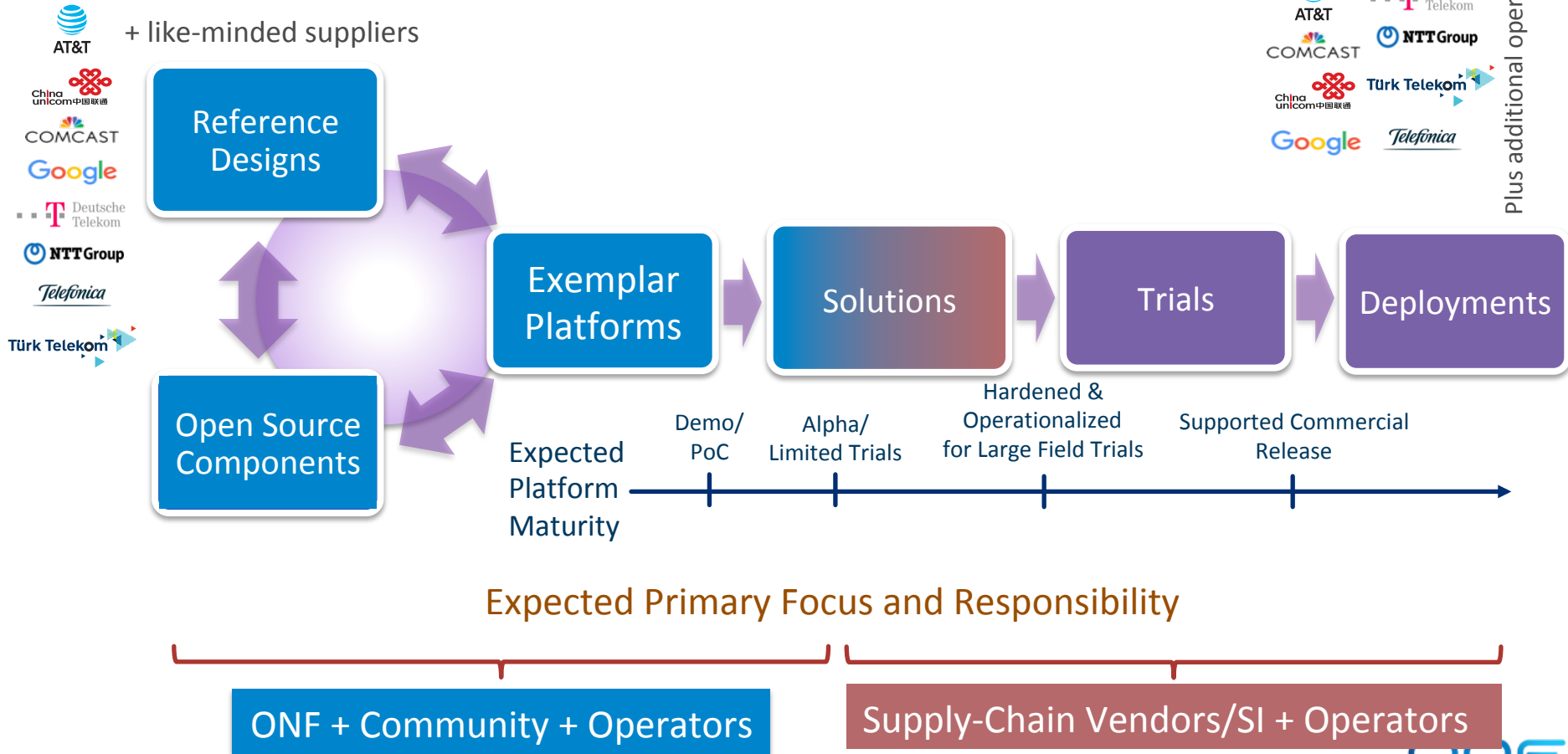
Yet no one is jumping in "with two feet" to do this! Why?

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Let's dig a little deeper to try to decipher why?

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Contents

- Path to production deployment as envisioned in early 2018

- Where are we today?

- The Gap between ONF's artifacts and operator's needs

- Eco-system Perspectives

- Q & A

# ONF Strategic Plan: Path to Deployment (March 2018)

Where are we today?

- ONF has delivered a software stack and solution platforms (built around disruptive architecture with disaggregation and white boxes) with a solid architecture
  - Many successful PoCs and lab trials

- ONF Operators want to put these platforms into production
  - ONOS/Trellis in production (limited) at Comcast
  - SEBA on a path to field trials at AT&T, DT and TT.
  - SEBA Production deployments expected to commence in 2019
  - UPAN and ODTN are a few months months behind

The Billion+ Dollar GAP
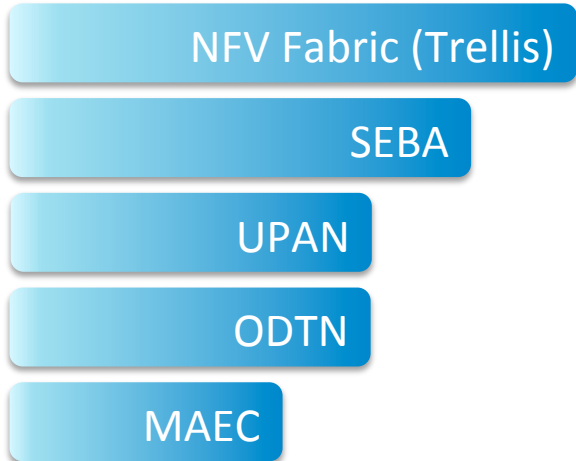
Maturation of Open Source

Three Examples

Linux

Unix at AT&T

- 1969-74 → Skunkworks Project within Bell Labs
- 1974-82 → Used internally at AT&T
- 1983-87 → System V (R1-R4) → AIX, HP-UX, IRIX, Solaris,…

Unix in Universities

- 1978-94 → BSD at Berkeley → SunOS, MacOS, OpenBSD, FreeBSD,…
- 1980s → Significant funding from DARPA

Linux

- 1991-95 → Unpaid Hobbyists (implemented Unix on x86 / GNU license)
- 2000 → IBM announced it was investing $1B in Linux
- 2000 → Industry Consortium set up OSDL (Open Source Development Lab)
  - Established to "…promote the growth and adoption of Linux."
  - Included a "small and mighty" development team (my words)
- 2007 → OSDL and Free Standards Group merged to form the Linux Foundation

Kubernetes

History of Containers

- 2003 → VServers v1.0
- 2008 → Linux Containers (LXC) released as part of Linux 2.6.24
- 2013 → First open source release of Docker

Container Management at Google

- 1999-2010 → Google comes of age
  - Scaling Clusters
  - Scaling Services (Micro-Services Architecture)
  - Scaling Engineering
  - Honing Life-Cycle Management (Canary Rollout, SREs)
- 2015 → Publish Paper on Borg (Large Scale Cluster Management)
- 2015 → Released v1.0 of Kubernetes, based on Borg
- 2015 → Google partnered with LF to form the Cloud Native Computing Foundation
  - Established to "advance key open source technologies that constitute modern, elastic computing"

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History at AT&T

- 2013 → Started to talk publicly about Domain 2.0
- 2016 → Published ECOMP White-Paper ($100M+ investment)
- 2017 → ECOMP and Open-O merged to form ONAP
- 2017 → Amsterdam version of ONAP released through Linux Foundation

Subsequent Developments
- Being Containerized

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Takeaways

- Multi-year "incubation" period led by a small team to establish architecture

- Variable time from concept to production (early use spurs maturity)

- Continual improvement/evolution once stressed by production use

- Significant investment before the community begins to contribute

- Typical to have a core development team even after mainstreamed

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How to Fill the Billion+ Dollar Gap?

Contents

- Path to Production as envisioned in early 2018

- Where are we today?

- The Gap between ONF's artifacts and operator's needs

- **Eco-system Perspectives**

Incumbent TEM Perspective

- Message willingness to adopt open networking
  - Disaggregation, open source SDN and white boxes
- But continue to sell "closed and proprietary" solutions with some open source
- They observe:
  - Open source and white box solutions are not maturing fast enough
  - Operators' operations do not wish consume immature solutions
  - So why should they change their ways?

TEMs unlikely to risk their existing business while waiting for Open Source platforms and components to mature and new business models to emerge.

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Challengers/System Integrators Perspective

- They see a big opportunity, but lack
  - Right software skillset
  - Appetite for $20-$30M investment, before serious operator revenue

- They approach operators looking for a clear path to revenue and (big) ROI and operators are not ready to make such commitments

Challengers and System Integrators seem to have forgotten
"No Risk, No Gain!"

Venture Capitalist & Entrepreneur Perspective

- VCs seldom fund telco focused software startup ideas, citing

  - Operators have very long sale-cycles

  - Operators don't like to buy from startups. at best they make an TEM to buy the startup

  - Operators can change their mind and continue with incumbent TEMs: the "low risk" path

- High tech has been hot: VCs and Entrepreneurs find other more attractive opportunities

  - They are more interested in opportunities that bypass operators and create value on top

Entrepreneurs/VCs need to take a closer look

- There is a BIG opportunity!

Operator Perspective

Operators are doing their part and expect supply-chain to step up

- Operators have publicly shared their intent and business realities

- They are already investing in ONF and other open source and white box initiatives

- They have allocated their teams and doing trials with solutions based on disaggregation, open source and white boxes

Operators observe

- Supply-chain players cannot expect "PO" or equivalent commitment from operators before making their investment and placing bets

**A few forward thinking operators may need to go the extra mile
to help prime the pump,
by investing alongside their supply chains and creating a successful DevOps model
to productize solutions they need**

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Who can unlock this billion⁺ dollar puzzle?

A great opportunity for all stakeholders that want to challenge the status quo of past 40 years

ONF Connect has brought people together
who are actively working on unlocking this puzzle!