

What we need to overcome in order to benefit fully from Network Softwarization

A man with a beard, wearing a red and blue plaid shirt, is shown in profile from the waist up, looking at a tablet computer. He is standing on a hill overlooking a city at sunset. The sky is filled with soft, golden light and scattered clouds. The city below is visible with its buildings and trees, some of which have autumn-colored foliage. The overall mood is contemplative and forward-looking.

Roberto Kung,
Director of Orange Expert Program
SVP Technology & Operation

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Where are we?

- **Different environments**
 - Level of developments and infrastructure
 - Regulations...
- **Different usages**
 - Level of B2B
 - Level of digitalization
 - Specific usage such as banking...
- **Inclusivity is a key concern for Orange.**

Orange has good view of very different situations as shown in the next 2 slides...

Orange at a glance



1 role

Multi-services operator

5 activities



- Communication services for individuals
- Communication services for businesses
- Content
- Mobile financial services
- Wholesale



3 types of customers

- Individuals
- Businesses
- Operators and service providers



264 million customers



28 countries for consumer services and a global presence with Orange Business Services



150,700 employees



€41.4 billion in revenues



€7.4 billion in investments



220 countries and territories for business

- Subsidiaries
- Orange Labs
- Technocentre
- △ Orange Services Group

What is the vision with softwarization?

- **End-to-end agility**

- At all level: Terminals, CPE, Home Lan, Networks, IT applications....
- For new features, for customization, for correcting any issue
- Like OTT applications



- **New applications**



- Massive IoT, specialized services (industry 4.0...), new verticals (banking...)
- **Softwarization is a key enabler to reach this agility while remaining competitive**

How to benefit from Softwarisation in so many different situations?

Technical drivers for Network Softwarization (1)

- Many technology evolutions are being introduced by network operators.
- 5G including:
 - Devices (smartphones, IoT) and enablers such as slicing
 - 5GC (Core), micro-service based. To be available at SA (Stand alone) stage that could be deployed in 2020.



The live 5G networks today, in South Korea and the US, for example, are primarily providing enhanced mobile broadband services, which can be achieved with non-standalone mode, i.e. overlaying 5G radio networks on top of 4G core. This was the architecture that Huawei used when demonstrating 5G at MWC on Vodafone's network. On the other hand, to achieve 5G's full capabilities, including to provide virtualised networks (e.g. network slicing for a particular client) and to run the extreme low latency applications (e.g. automatic cars) there would need end-to-end 5G networks, i.e. 5G radio and 5G core.

Technical drivers for Network Softwarization (2)

- **IT technology**

- CI/CD, DevOps
- Telco Cloud, SDN/NFV



- **Open source in addition to standards to get reference implementations**

- ORAN, ONAP, ODL, Open Stack...and many, many others...

- **AI and Machine Learning, Big data**

- Collecting data from devices, probes / robots; Multi purpose DB
- Fine tuning rules and policies, with the help of AI/ML



- **RPA, Automation, Blockchains, Etc., Etc.**

All these technologies contribute to advancing network softwarization.

However, networks are difficult to upgrade

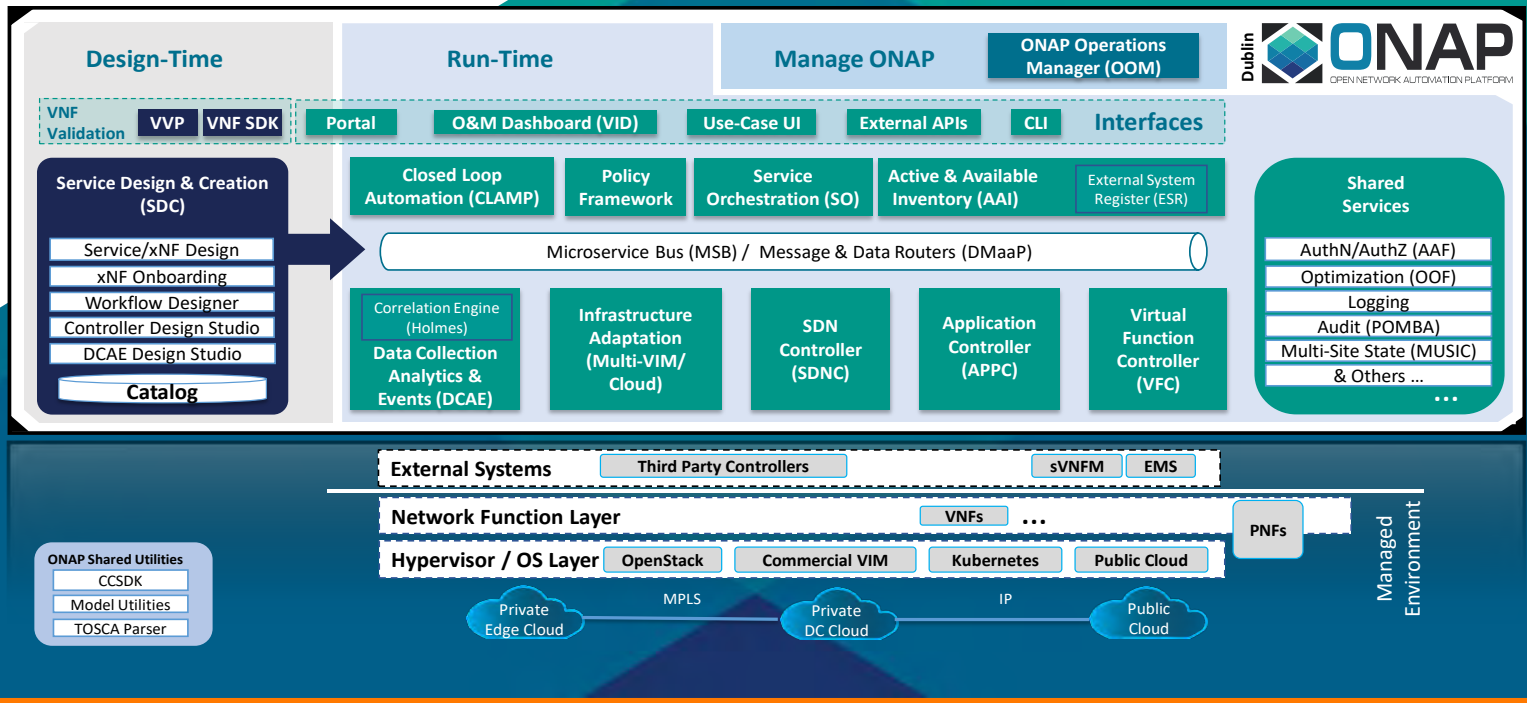
- **Different generations** of equipment, including terminals (for instance, 2G phones).
- Sheer **cost** of updating technologies (Orange ‘only’ €7B per year) and installing physical devices (fiber...).
- Impact on **Operation** and its culture (the legacy part is huge)
- Many solutions adding complexity
- Interconnexion: migration engineering between worlds (see IPv4, IPv6), Gateways, Roaming agreements...
- Management: Mediation, Connectors, API, Umbrellas
- Automation to hide complexity of Life Cycle Management and Operation.
Important for starting and getting operational culture.

However, there is the BSS/OSS headache

- There has been much **less standardization** in the area of IT apps.
- Many applications doing the same thing... especially with different networks
- First, allow for automated provisioning. Relevant plugs with TMF API. Key with the introduction of 5G Slicing and NSaaS (Network Slice-as-a-Service).
Then dynamically (re-)negotiate slice service parameters + feedback mechanisms (check delivery complies with negotiated request).
- Start benefit from **ONAP** common framework
- Later benefit from **TMF ODA** (Open Digital Architecture) common framework

OSS / BSS / Other

Legend **Design** **Orchestration & Management** **Operations**



Collaboration



Member Projects

Open Digital Architecture (ODA) Project

TM Forum's Open Digital Architecture (ODA) project is envisioned as a more agile replacement for traditional operational and business support systems (OSS/BSS) architecture.

"The telecoms industry is at a crossroads," says TM Forum CEO Nik Willetts. "There is a window of opportunity to move beyond connectivity and embrace new opportunities for growth. To succeed, the industry must radically simplify and automate core business operations to deliver the agility and efficiency needed to compete in today's market."

Indeed, business-to-consumer markets have been transformed by social media and commerce platforms, enabled by communications service providers' (CSPs') multi-billion-dollar investments in global communications networks. But CSPs' piece of the pie is shrinking, as ubiquitous connectivity has driven down prices, eroded profit margins and lengthened the time it takes for new infrastructure to pay back. This in turn slows the cycle of innovation.

The project teams are currently working on:

- Frameworkx project
- IoE & Digital Ecosystems Project
- Open Digital Architecture (ODA) Project
- Smart City Project

ODA – An architecture for the digital era!

Identifying the domains

tmforum

Party Management to support complex business models; it handles party data and functions

Intelligence Management to support systems of insight, AI, machine learning and cognitive capabilities

Engagement Management for a single coherent customer experience

Engagement Management
Front ends
API stubs
B2B gateway

Party Management

Decoupling and integration

Core Commerce Management

Decoupling and integration

Production

Operational Business Processes

Production to abstract the complexity of infrastructure; it is organized by a technical catalog and covers functions for service production, operation and maintenance

Core Commerce Management, to support marketplace offers; it is organized by an offer and product catalog and covers order management functions

Separation of concerns and simplification through decoupling of the domains.

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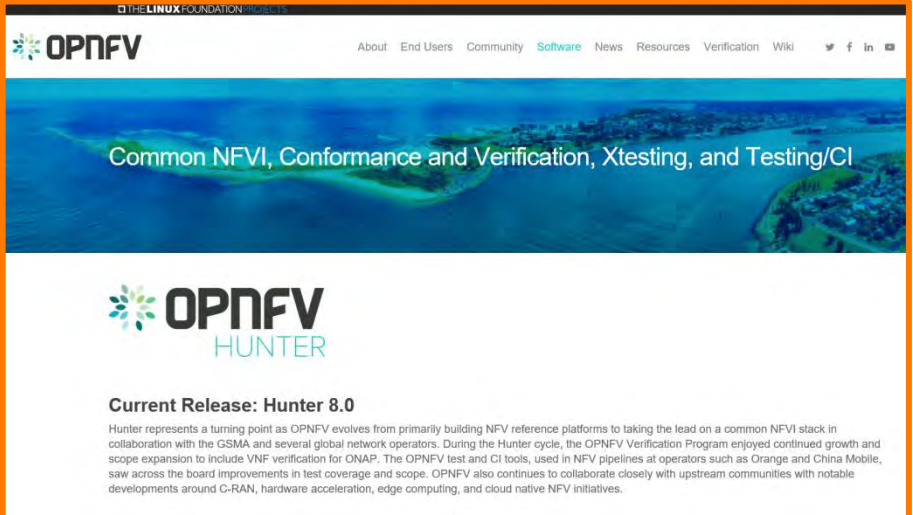
Other issues are to be solved... (1)

- **How to handle the diversity of suppliers**

- Leading to various ways of working
- Difficulties to integrate. Traditional IoT (Interoperability Tests) not sufficient.

→ Orange has pushed collaboration between 3rd parties

- OPNFV, functest, x-testing to automate integration between various 3rd parties.



The screenshot shows the OPNFV Hunter website. At the top, it says 'THE LINUX FOUNDATION PROJECTS' and 'OPNFV'. The navigation menu includes 'About', 'End Users', 'Community', 'Software', 'News', 'Resources', 'Verification', and 'Wiki'. The main banner features a blue and green abstract image with the text 'Common NFVI, Conformance and Verification, Xtesting, and Testing/CI'. Below the banner is the OPNFV Hunter logo. The text 'Current Release: Hunter 8.0' is displayed, followed by a paragraph describing the Hunter cycle and its collaboration with the GSMA and global network operators.

Other issues are to be solved... (2)

- **How to implement advanced agile mode while maintaining security with 3rd parties.**
 - Some applications must be developed in-house by the network operator, with the ability to use advanced agile mode (DevOps, SecDevOps, BusDevOps, towards NoOps...).
 - However, most applications are developed by 3rd parties.
 - To get agility with supplier(s), necessary to share a detailed approach and tools to get a true JAD (Joint Agile Delivery) with the supplier. For instance, this has been studied in TMF.
 - One roof, tool/process sharing
 - Security monitoring independently

Other issues are to be solved... (3)

- **How to avoid vendor locking while the IT infrastructure stack is integrated with network applications**
 - In the short term, stacking the IT infrastructure with generic hardware, the VIM and VNFs is not so easy yet.
 - ➔ Specific vertical integration often remains the rule taking into account
 - Operator specific constraints (GDPR, security, legal...)
 - Specific performance constraint (with specified H/W and mechanisms such as SR-IoV, DPDK...).
 - Full independency between layers is not yet there: still some vendor locking.
 - ➔ Towards better maturity between VIM (such as Open Stack) and Network controllers (such as SDN-C).

Other issues are to be solved... (4)

- **How to introduce an adequate underlying platform ('Telco Cloud'), able to execute software where it makes most sense**
 - Central execution, or closer to the customer for better latency – few millisecond type of requirements.
 - The Telco Cloud architecture is not so clear for the time being.
 - NGPOP architecture, impacting network POP architecture
 - Impact on backhaul architecture.

Other issues are to be solved... (5)

- **And, last but not least, how to move towards a true NoOps world with automation, allowing operation to focus on Quality of Service improvement.**
 - ➔ Automated change, hiding existing complexity. Shortening of LCM (Life Cycle Management)
 - ➔ Automation of Incident Detection and Workaround execution (first way to close the loop)
 - ➔ Operation focusing rather on problem resolution (using advanced tools).

Barriers and Frontiers of Softwarization for the Network of 2030

- **Legacy equipment** will still be there, especially in less developed countries.
 - May hinder the deployment of advanced services such as 5G slicing which is an important enabler for Business.
 - Telco cloud not ubiquitous yet.
- Industries will still use many **legacy factories**
 - Legacy tools or processes making it difficult to benefit from softwarisation (for instance interconnexion). Green field approach would be preferable.
- **Security issues** and concerns
 - At governmental level, cybersecurity, data protection... making it difficult to implement advanced agile mode such as JAD with partners. Silo solutions will not allow for taking advantage of all the innovations.
- At the operational level, a full NoOps world with automation may be difficult to reach. This seems reachable.

Thank you!

