



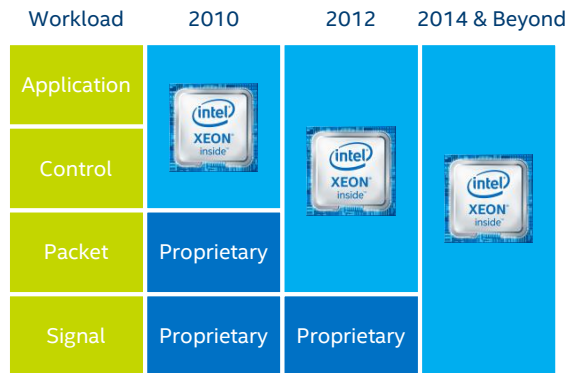
THE FAST-FORWARD PATH TO NFV IN LATIN AMERICA

Ivan Parra

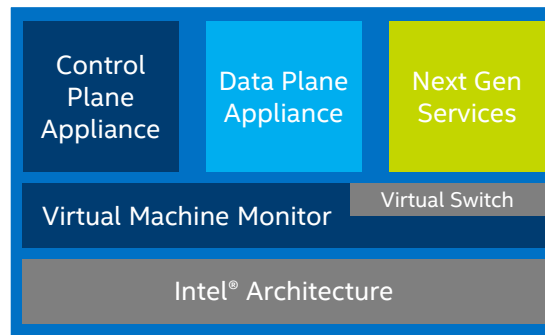
2018

TRANSFORMING THE NETWORK

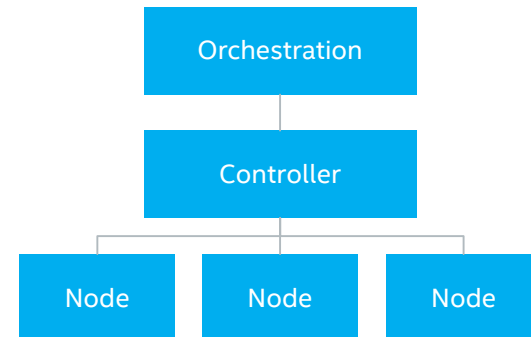
MAKING IT TELCO CLOUD READY



4:1 Workload Consolidation



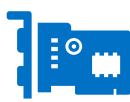
NFV - Virtualized Network Apps



NFV/SDN for Communications



IA Processor



NIC Silicon



Chipset Acceleration



Switch Silicon



Open Software



Intel® Virtualization Technology

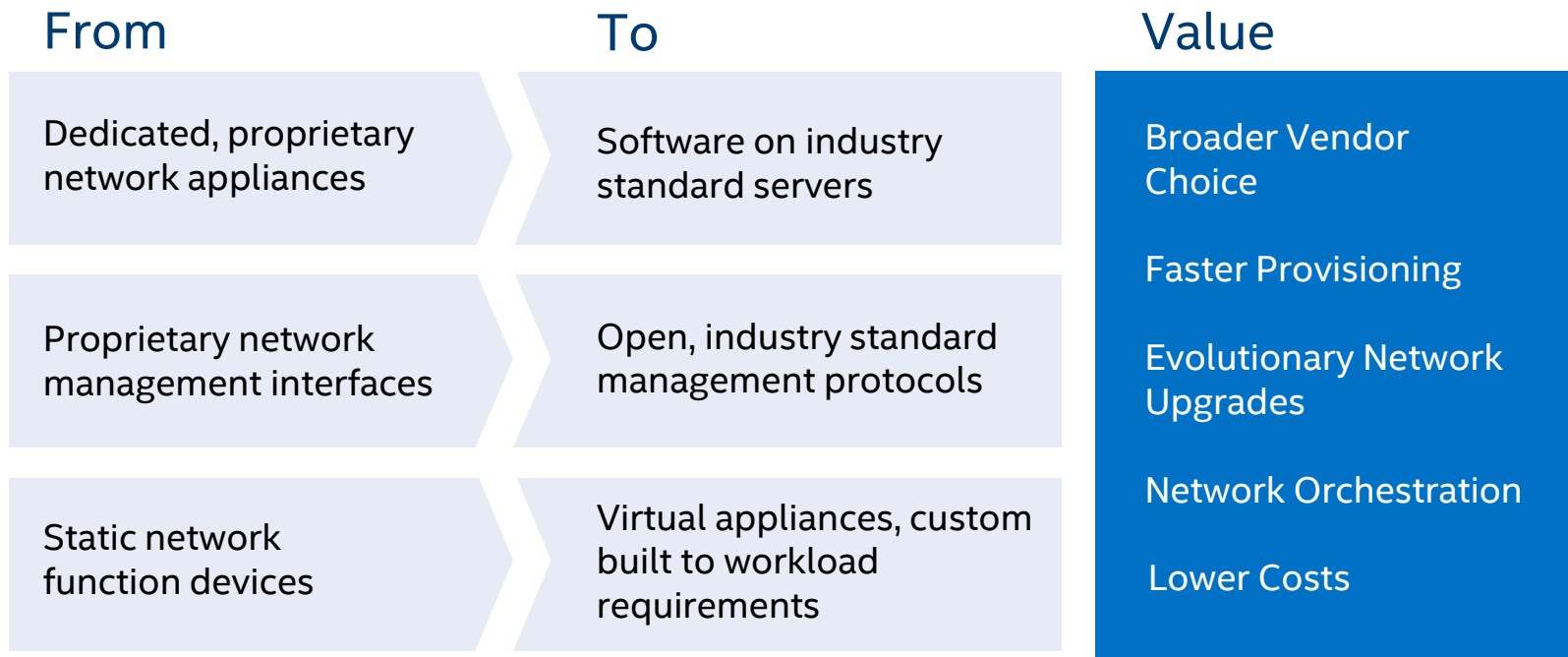


Intel® Node Manager Power and Thermal Aware Scheduling

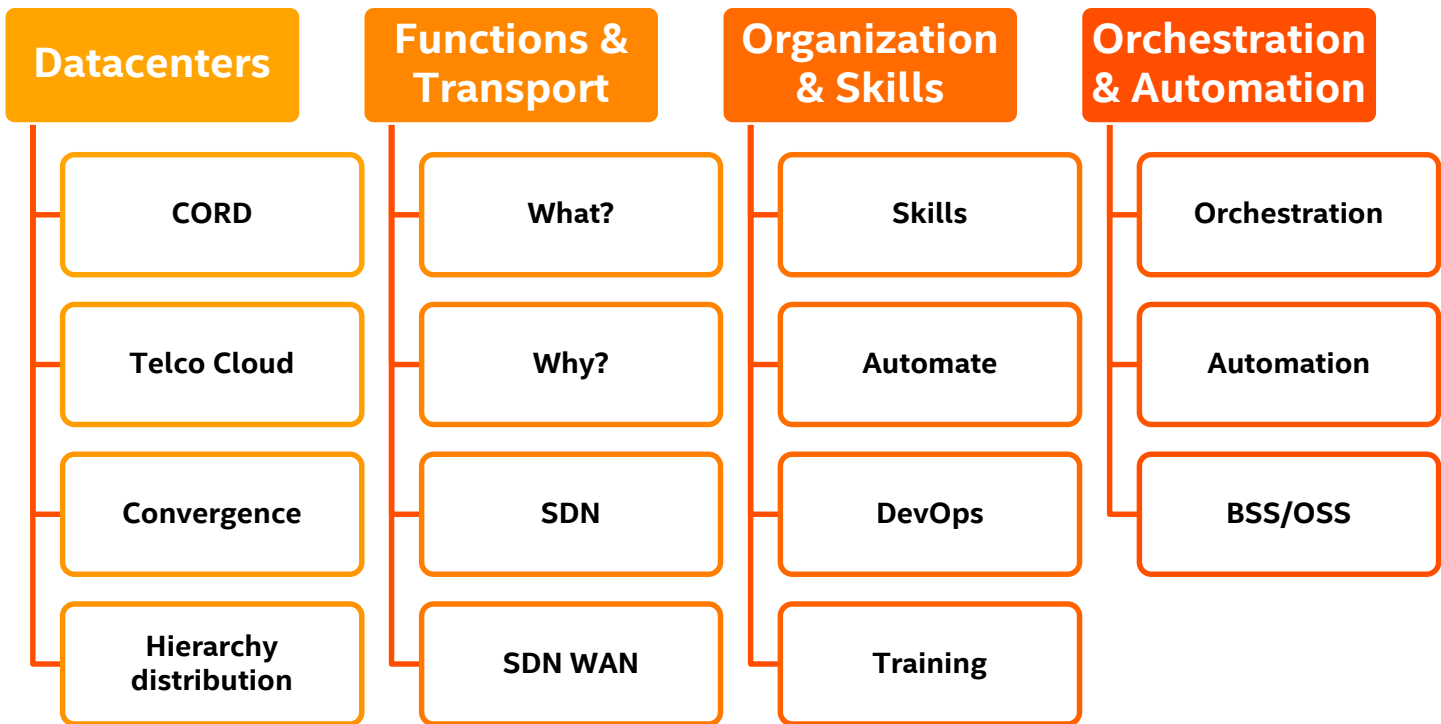


Intel® Trusted Execution Technology Cache Monitoring Technology Fine grain performance management

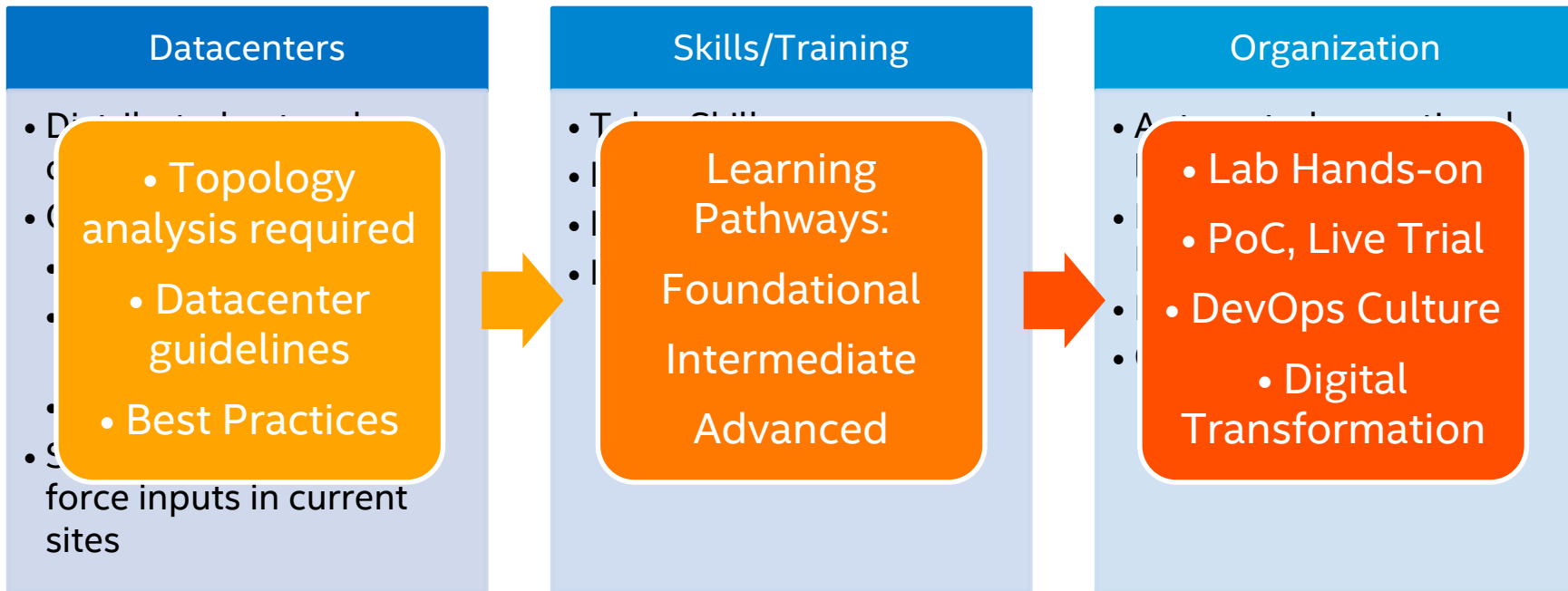
Network Transformation



General Strategy



Comms Service Providers Challenges



Datacenters Hierarchy



National Datacenter



Regional Datacenter



Edge DC / PoP

VNFs Distribution

National Datacenter

- Critical Mission
- Management Functions
- Tier DC
- Orchestration functions
- Large Databases
- Large Storage
- Large Bandwidth

Regional Datacenter

- Distributed VNFs
- Exit to the Internet
- Close to Edge
- Traffic Overflow

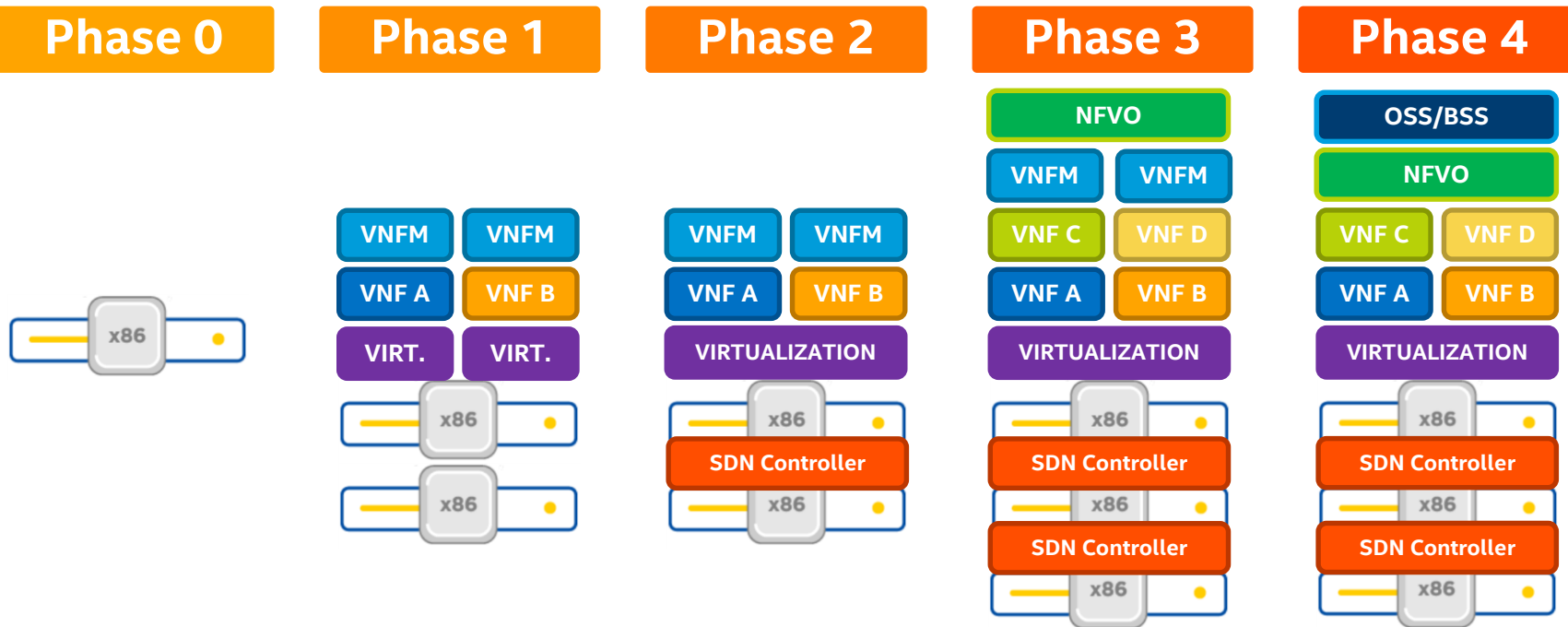
MAEC

- Video analytics
- Location services
- Internet-of-Things (IoT)
- Augmented reality
- Optimized local content distribution
- Traffic Optimization
- data caching

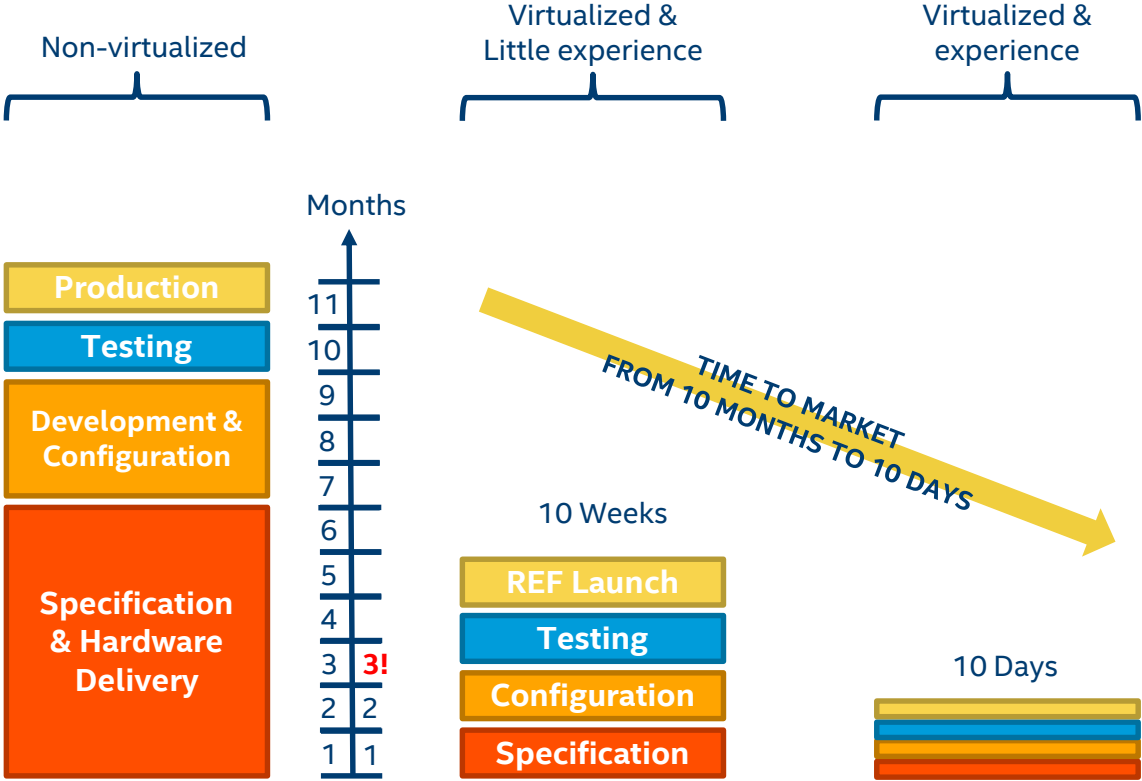
PNFs

- Physical network functions: Those that due to complexity in virtualizing or not having long term evolution do not have a clear roadmap towards virtualization

Fast-Forward Path To NFV



Timeline?



VNF Dimensioning (Performance / Capacity)

Function	Variable	Installed Capacity	Used Capacity	EOY 1	EOY 2...
PCRF	Gx Session (M)	Current capacity	Today's capacity	Projection	Projection

VNF Capacity

Maximum number Gx TPS			
Maximum Capacity x VM	TPS #		
1vCPU	TPS Per vCPU		
1GB Memory	TPS Per GB		
1GB Disk	TPS Per Disk		
VNFC NAME	VNF Component		
VNFC Flavor: CPU, MEM GB, DISK GB	CPU	MEM	DISK

NFVI Dimensioning

What's needed?

Minimum:

VM Flavor: vCPU, vRAM, vStorage

Advanced:

VNFC Name/Description, Instantiation, Redundancy Model, Minimum and Maximum # of VM supported, State, Physical CPU, NICS, Bandwidth, Ports, External Storage, EPA Functionalities, VM over Servers Layouts, Physical Layout

NFVI Dimensioning

VNF Name				VNFC Name																
Name	Load Balancing Model	Scaling Model	Internal Structure	Name of Subfunction	Functional description	Instantiation	Redundancy Model	min # of VM in redundant mode	scaling granularity [VM]	scalability span (max # of VM supported)	State	# of VM in redundant mode	Physical CPU [#]	vCPU [#]	vRAM [GB]	vStorage [GB]	vNIC [#]	Physical NIC X-Port/XXGb Speed	Bandwidth [Mbps]	Ext. Storage [GB]
IMS	VNF-internal Load Balancer	Auto scaling	Modular	VNFM	VNF Manager	Non-parallelizable [1,1]	active-standby	2			Stateless	2		3	24	320				
				EM	Element Manager	Non-parallelizable [1,1]	active-standby	2			Stateless	2		2	16	160				
				LB	Media Resource Broker (Load Balancer)	Non-parallelizable [1,1]	active-standby	2			Stateless	2		3	48	80				
				MRF-C	MRF-Control Subfunction	Parallelizable [1,n]	active-standby	2			Stateful	2		4	16	160				
				MRF-P	MRF-Processing Subfunction	Parallelizable [1,n]	active-standby	2			Stateless	2		7	56	240				

NFVI Dimensioning

slot	CPU0												CPU1												CPU socket	
8	VNFM (act)		MRF EM																						VM type	
	24		16																						Memory (GB)	
	320		160																						Storage (GB)	
	0	1	2	3	4	5	6	7	8	9	10	11	0	1	2	3	4	5	6	7	8	9	10	11	CPU	
7	VNFM (stby)		MRF EM																						VM type	
	24		16																						Memory (GB)	
	320		160																						Storage (GB)	
	0	1	2	3	4	5	6	7	8	9	10	11	0	1	2	3	4	5	6	7	8	9	10	11	CPU	
6	MRF-C (act)			MRF-P (act)								MRB (act)													VM type	
	16			56								48													Memory (GB)	
	160			240								80													Storage (GB)	
	0	1	2	3	4	5	6	7	8	9	10	11	0	1	2	3	4	5	6	7	8	9	10	11	CPU	
5	MRF-C (stdby)			MRF-P (stdby)								MRB (stdby)														VM type
	16			56								48													Memory (GB)	
	160			240								80													Storage (GB)	
	0	1	2	3	4	5	6	7	8	9	10	11	0	1	2	3	4	5	6	7	8	9	10	11	CPU	
4																									VM type	
																									Memory (GB)	
																									Storage (GB)	
	0	1	2	3	4	5	6	7	8	9	10	11	0	1	2	3	4	5	6	7	8	9	10	11	CPU	

How Intel can help you?

Documentation

- **RFx/SoC**
 - IMS
 - Data Center
 - NFVI
 - OCS
 - Orchestration
 - RAN
 - RSA
 - SDN
 - SD-WAN
 - Service Chaining
 - SoC
 - vCDN
 - vCPE
 - vEPC
 - vHE
 - vSBC

PoC / Trails / Financial

- **Test Protocols**
 - vEPC
 - SDN
 - Hypervisors
 - NFVI
 - VIMs
 - VNFs
 - Orchestration
 - Generic documents
- **Hardware / Testbed**
- **Technical Resources**
- **Compliance Analysis**
- **Data Center Best Practices**
- **Discounts**
- **Licensing models**

Training

- Workshops
- Newsletter
- Technical Events
- Technical Experts
- Ecosystem Partner
- Agnostic Partner
- Network Builders University

What to watch

- VNFs using blades, instead of resources...
- VM sizing, will vary from vendor to vendor, so hard to model hardware utilization.
- Scale In/Out times: Hypervisor does affect.
- Onboarding Times: Relative to local support...but is a fact that the second time is 50% faster.
- Throughput Capacity: Which interface you are using? What is the requirement?
- Theoretical vs Real: Data is not consistent.

What to watch

- Technical vs Political: It will depend on who needs to work with whom.
- Keep agnostic: TEMs will try to persuade you.
- Design: Open Software will need of integration. Focus on orchestration/automation.
- Open Source versions: Backwards compatibility is an important aspect.
- Root Cause analysis: Avoid finger pointing, watch for console log of the VNF.

More Challenges :(

- Technical training on new NFV/SDN paradigm.
- Different VNFs sharing a common COTS hardware (Who's responsible?)
- Maturity from most of the solutions (Too much slideware. On PoC's different story)
- In the beginning few standards, nowadays, too many (uncertainty)
- Few end to end solutions multivendor, still offered as Silos.
- High dependency from system integrators (Customization, Onboarding, governance model, support...)
- Exploding existing Central Office locations (retrofitting) vs Greenfield Telco DC.

Intel® Network Builders

**A community enabling Intel architecture-based,
open standards solutions for the Network**

Launched 2 years ago | Over 280 partners



University Overview

Intel® Network Builders University is a comprehensive network functions virtualization (NFV) and software-defined networking (SDN) training program.

- **+200 videos and over 50 hours of programming**
- **Dozens of white papers, webinars, podcasts, and related materials**

Fast-Track Curriculum –3 Convenient Levels

Watching *all* the University videos could take weeks, even months. Your time is valuable, so a fast track has been designed at 3 Levels:

- **Level 1: Introduction –SDN/NFV Fundamentals**
- **Level 2: Experienced –Intel Technology Enablement**
- **Level 3: Advanced –Engineering Deep Dive**

Getting Started

Prior to your Campus Tour call, you will be emailed an **Orientation Guide**. The Guide provides instructions for registering with the Intel Network Builders Program:

Registration and Login

At <https://networkbuilders.intel.com>, click the login button at the upper right.



Content

At the end of each training video, you can take a quiz to test your knowledge. The quizzes are multiple choice, and you have multiple opportunities to retake the quiz until you pass.

Chapter 1: Using Open vSwitch and the Data Plane Development Kit To Accelerate Virtual Switching.



In this course, James Chapman, Intel Platform Applications Engineer in the Network Platforms Group, provides an overview of Open vSwitch and the Data Plane Development Kit (DPDK) and demonstrates how combining the two accelerates virtual switching.

Quiz Status

Once you have watched the video, please take the quiz.

[Take Quiz](#)

Related Materials

- [Open vSwitch](#) (Website)
- [DPDK](#) (Website)

Customized Pathways

Intel® Builders





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FOUNDATIONAL LEARNING PATHWAY

The foundational level learning pathway serves as the introductory level of content within the university. There are a variety of topics and technologies covered across network transformation. Each class within a particular domain or topic area is a stand-alone class, allowing students to quickly progress through the content and move into courses within the intermediate and advanced pathways. No courses are mandatory and students can self-navigate to the topics of interest. We do recommend taking the courses in order for the best result.

START NOW



INTERMEDIATE LEARNING PATHWAY

Now that the learner has completed the foundational level content, it is time to move into the intermediate level courses. Use this pathway to explore deeper technical content on the web-based learning platform. Courses at this level build on the foundational level courses. For the best result, we recommend taking the courses in the suggested order.

START NOW



ADVANCED LEARNING PATHWAY

After completing both the foundational and intermediate level courses, the learner is ready for the advanced learning pathway. The content within the advanced learning pathway builds on previous pathways and delves even deeper into the technical content. We recommend taking the content in the order provided and completing all provided quizzes.

START NOW

Foundational Learning Pathway

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COURSES IN YOUR LEARNING PATH



01

Software Defined Infrastructure (SDI) – A World Where the Application Defines the System
Intel® Network Builders

START

02

Network Transformation
Intel® Network Builders

START



Level 1: Introduction

SDN/NFV Fundamentals

This program introduces Intel's technology, architecture and vision, with foundational training courses on network functions virtualization (NFV), software defined networking (SDN), and management and orchestration (MANO).

- Course 1: SDI Vision
- Course 2: Network Transformation
- Course 3: NFV Technologies
- Course 7/Module 1: NFV/SDN Essentials Series –Network Virtualization
- Course 8/Module 2: NFV/SDN Essentials Series –Virtualization Concepts
- Course 9/Module 3: NFV/SDN Essentials Series –Network Functions Virtualization
- Course 11/Module 5: NFV/SDN Essentials Series –Software-Define Networking
- Course 13: Containers 101: The Technology that Drives the Cloud

