napatech

CAPITAL MARKETS DAY
APRIL 2016

CAPITAL MARKETS DAY
WELCOME

Agenda
- Strategy summary
- Accelerator portfolio and use cases
- Network Recorder Portfolio and use cases
- NFV market, opportunity and use cases
- Taking Napatech to 100 MUSD in 2020
- Optional lunch at 12:30

Presenters
- Henrik Brill Jensen, CEO
- Stig Bang, Product Line Business Director – Accelerators
- Rick Truitt, VP, Global Product Line – Platforms
- Dan Joe Barry, VP Positioning and Chief Evangelist

# SMARTER DATA. DELIVERED.
OUR STRATEGY

- Our ambition is to be the #1 vendor for Smarter Data Delivery Solutions – providing a 100 MUSD top-line by 2020

- Our strategy is powered by major global trends within mobile, security, virtualization and IOT, as well as the continuous enhancement of network connectivity towards Terabit speeds

- Our strategy is to secure success quickly through close collaboration with selected market-leading and innovative customers in the co-creation of new solutions, products and value-adding services

- Our strategy is based on a strong product portfolio powered by leading-edge core technology, which is positioned for growth based on clear strategic initiatives over the coming years

SMARTER DATA. DELIVERED.
OUR STRATEGY

We will secure our strategy by executing in 4 clearly defined areas

- **Accelerator solutions**, focusing on continued growth
- **Network Recorder solutions**, securing new market opportunities
- **Virtualization solutions**, capitalizing on strong growth in Network Function Virtualization
- **Continuous innovation**, expanding the application of Napatech technology and solutions into new markets
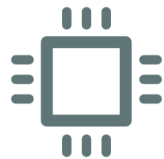
ACCELERATOR SOLUTIONS

RECORDER SOLUTIONS

VIRTUALIZED NETWORKS

EXCEPTIONAL INNOVATION

STRONG TECHNOLOGY, PORTFOLIO AND ORGANIZATION TO SECURE STRATEGIC AMBITIONS

Leading technology

Expanding the core

Firm strategic excecution

- World leading provider of network **ACCELERATOR** solutions based on the continuous introduction of innovative, market-leading products and solutions

- Products and solutions based on strong core technology innovation supported by world-class organizational capabilities

- Employees with decades of experience focusing on specific needs of our target customers

- Additional expected growth realized by continued enhancement of accelerator product line

- New **NETWORK RECORDING** product line expected to drive expansion in existing customer accounts and penetration into new market opportunities

- Organization adjusted to support and exploit full potential of expanded product portfolio and secure future growth

- New **NETWORK FUNCTION VIRTUALIZATION** product line capitalizing on strong growth and interest in virtualization

- Growth strategy developed by strengthened management team, validated with key customers and supported by market insights

- Strong strategic ambition, secured by firm execution of strategic road map over the next years
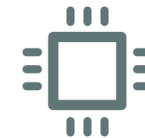
NAPATECH MARKET INSIGHTS
PROMISING GROWTH PLATFORMS

The combined potential towards 2020 building upon our Accelerator, Recorder and Virtualization solutions is huge and clearly shows a very attractive market size

+450 MUSD

ACCELERATORS – FULL POTENTIAL YET TO BE EXPLOITED

Scaling ongoing projects with Tier 1 Network Management, Telecom and Data Center Providers to the entire market offers a potential of more than USD 450 million by 2020*

ACCELERATOR SOLUTIONS

+600 MUSD

NETWORK RECORDERS – HUGE MARKET POTENTIAL

A combined focus on cross selling to existing OEM customers and new customer within Finance, Defense and Data Center Providers will open a network recorder market potential of more than 600 MUSD**

RECORDER SOLUTIONS

+6,000 MUSD

NETWORK FUNCTION VIRTUALIZATION – NEW OPPORTUNITIES

NFVI market is estimated to 300 MUSD in 2015 and are expected to grow to +6,000 MUSD by 2020***

VIRTUALIZED NETWORKS

Sources: * Based on Gartner market data and Napatech assessment,** Based on Gartner market data, US Department of Defense Cyberstrategy and Napatech insight, ***Aggregation of several sources: Orbis Research February 2015, "NFV Market Business Case", "Market Analysis and Forecasts 2015 – 2020", Infonetics November 2014, "Carrier SDN and NFV Hardware and Software", SDxCentral May 2015, "SDxCentral SDN and NFV Market Size Report"
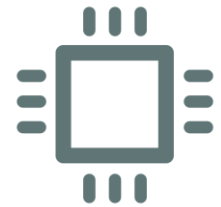
NAPATECH
ACCELERATORS

SMARTER DATA DELIVERY
IN REAL TIME

In a connected world, it is about getting all the right data you need – and providing the ability to analyze the data in real time. To get all the right data you need "Full Packet Capture".

Packet capture is a term used to describe solutions for reliably intercepting a data packet that is traversing specific computer network and then delivering the packet to an application for analysis.

Think – Smarter Data Delivery

ACCELERATOR SOLUTIONS

NAPATECH
ACCELERATORS

- State-of-the-art packet capture cards with guaranteed 100% data integrity

- Differs from normal network adapters by design: Built for analytics, not transport

- In network analytics, integrity and timing are everything – must be perfect

- Multiplies the customer application performance experience

- Simple to use – designed to work with all standard server models

- FPGA-based Accelerators – the foundation of Napatech business today

1x100G
2x100G

2x40G

4x10G
4X1G

2x10G
2X1G

WHAT IS DRIVING
THE NEED FOR ACCELERATORS?

Fundamentally …

- Our customers need to ensure the quality and security of the network services we all rely on

- And they need to know of any issues and react to them in real time

In light of …

- Explosive data growth, the world demands data!

- Rapid increase in new apps and services

- Higher network speeds – now at 100 Gigabit

- Billions of IOT devices coming online

- Growth in increasingly sophisticated threats

Data Volume

Data Types

Data Rate
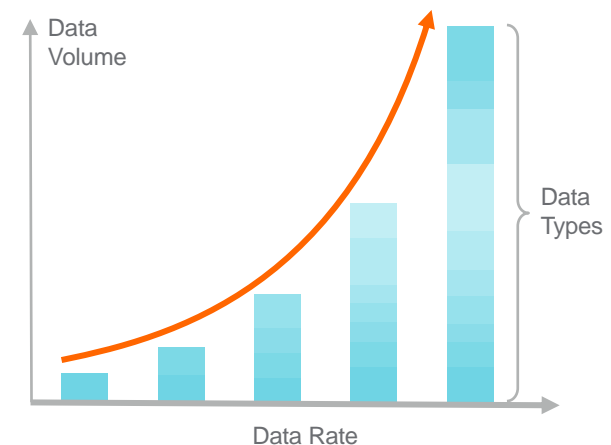
WHAT IS THE CHALLENGE THAT ACCELERATORS HELP ADDRESS

Real-time visibility – what is going on?

- Voice, video, and streaming services running on the network
- Number of users online and the services they use
- How smooth are the services running
- Is the data legitimate or is it malicious

Real-time decision and reaction – what to do?

- Prioritize between the services
- Re-route data
- Block or quarantine malicious data
- Count and bill the user for data consumption
- Offer the user a different service level

The 6.7 nanosecond challenge!

SMARTER DATA DELIVERY IN REAL TIME

Time-stamping of data

Receive network data

TS

300 Million data items received each second

SMARTER DATA DELIVERY IN REAL TIME

Time-stamping
of data

Receive
network data

Put data in the
right sequence

Identification of
data streams

TS

TS

TS

TS

Flow 3

Data preparation

**300 Million data items
received each second**

The right data to
the right applications
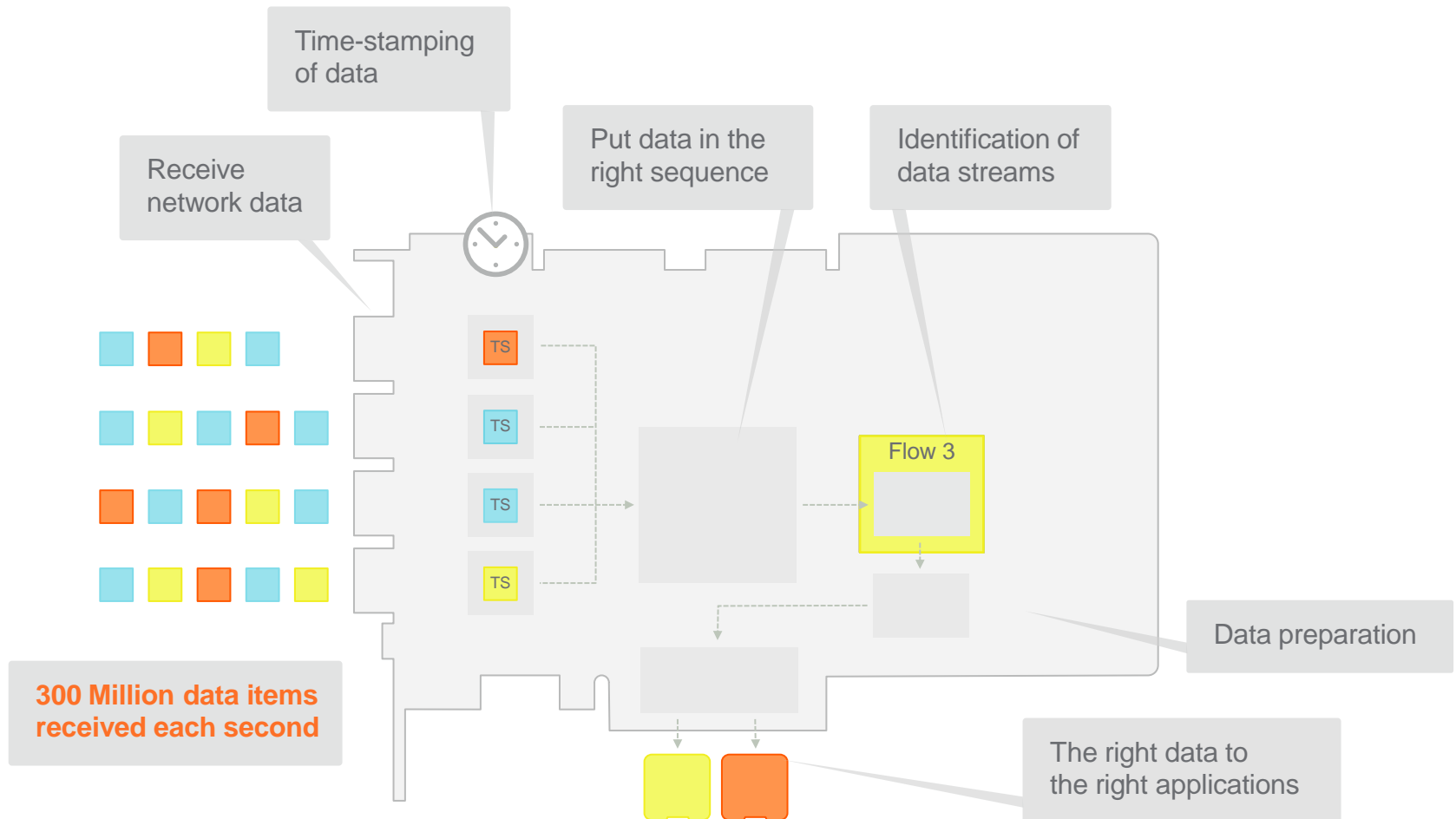
CUSTOMER CASE
CYBER SECURITY

The Market Challenge

- Up to now, we have relied on perimeter defenses or "threat prevention" to keep hackers out

- But threat prevention can only stop direct attacks already known to the security solution

- Increasingly, attacks are surfacing inside the networks – brought in by the users themselves

Unknown threat
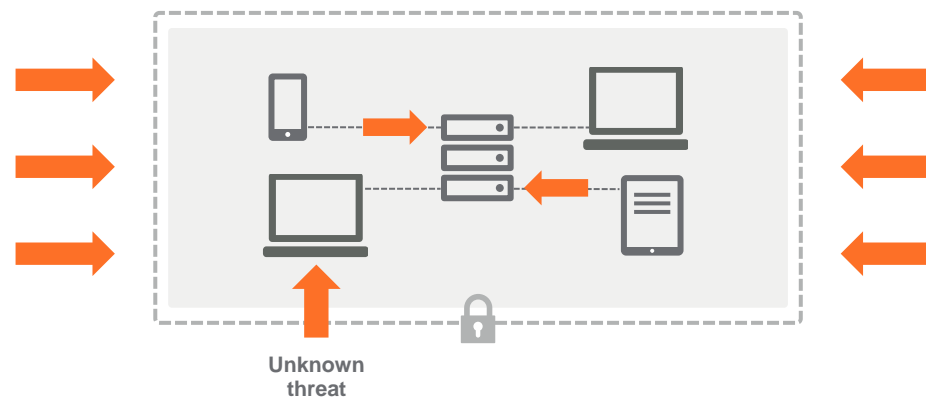
CUSTOMER CASE
CYBER SECURITY

The Cisco Solution

- Deploy network sensors with Napatech accelerator to find out how the "healthy" network behaves

- Deviations from the normal behavior are investigated

- Ability to detect threats that evaded prevention
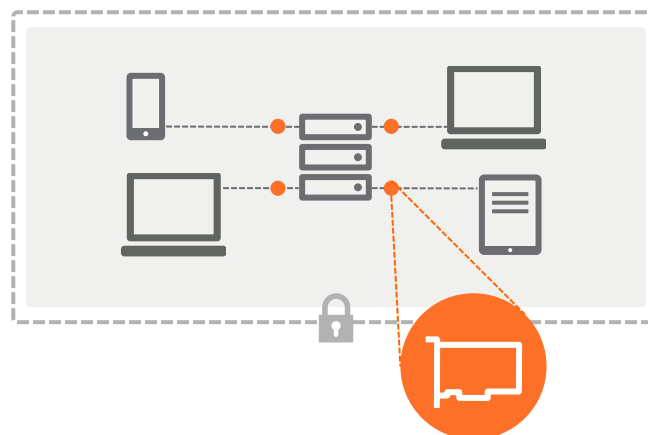
CUSTOMER CASE
CYBER SECURITY

Napatech enables Cisco to provide unique benefits

- 100% network data visibility
  – the crooks are hiding in the cracks!

- Total situational awareness of the network

- Performing continuous and comprehensive
  threat analysis in real time.

CUSTOMER CASE
QUALITY OF EXPERIENCE

The Market Challenge

- Ensuring the quality of voice calls on 4G data networks
- In real time, locating the exact source and location of the network issue

Hewlett Packard Enterprise

?

Location of issue

Quality problem!

User

4G Voice Service

Wide Area Network

Site A

Site B
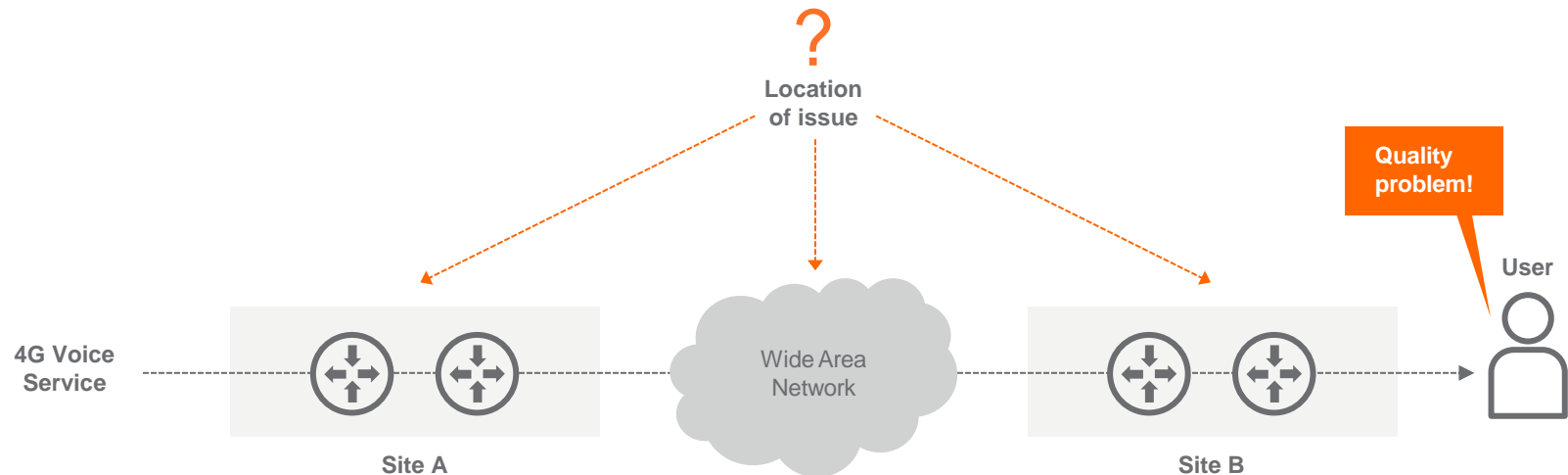
CUSTOMER CASE
QUALITY OF EXPERIENCE

The HP Enterprise solution

Hewlett Packard Enterprise

- Precise drill-down to service and user level quality measurements

- Real-time reaction to bottlenecks causing service degradation and data loss

- Compact solution capable of monitoring multiple points at once

4G Voice Service

Site A

Wide Area Network

Site B

User
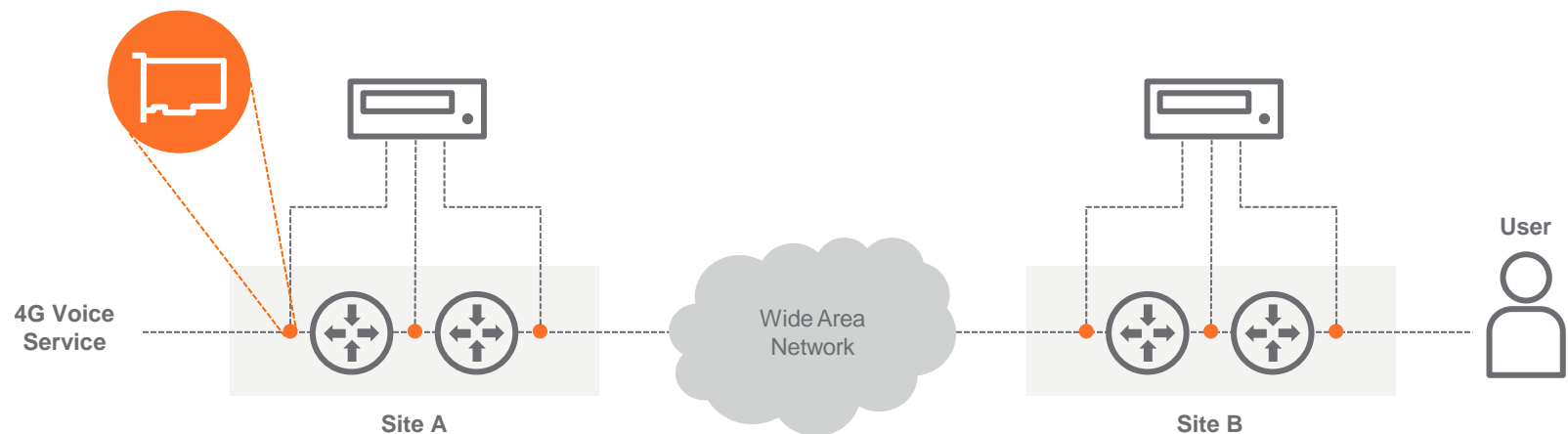
CUSTOMER CASE
QUALITY OF EXPERIENCE

Napatech enables HP Enterprise to provide unique benefits

- Unique fingerprinting and identification of data
- Nano second resolution time measurements
- Highly efficient solution – saves cost, power and rack space

Hewlett Packard Enterprise

4G Voice Service

LIMIT!

Wide Area Network

Site A

Site B

User
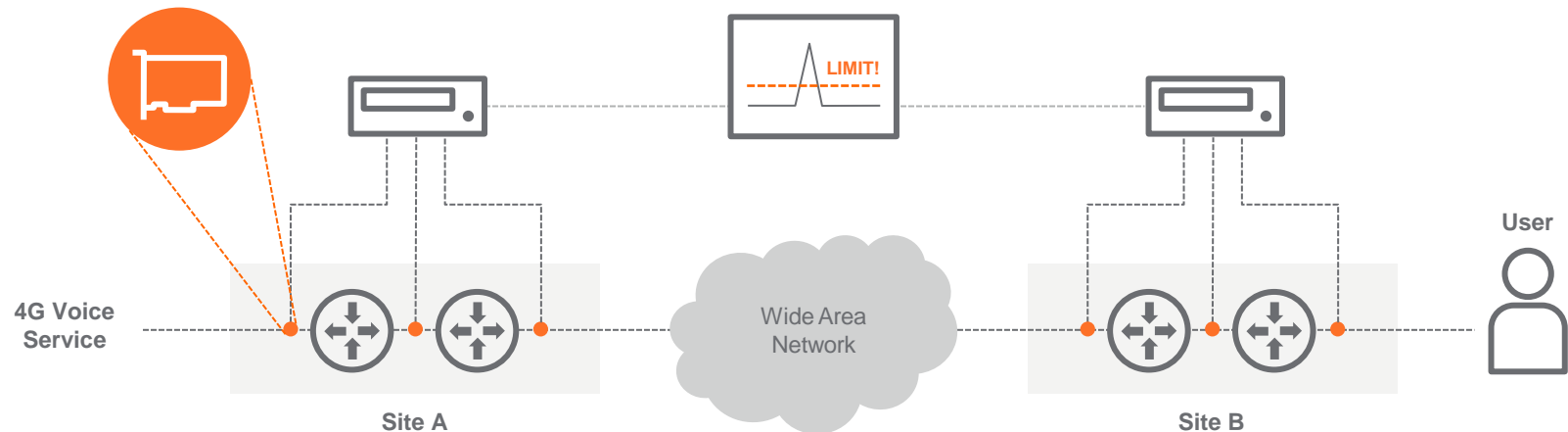
UNIQUELY POSITIONED TO SUCCEED

Our total solution approach

- Napatech Accelerators offers a complete portfolio from 1-200 Gigabit

- Scale inside the box – multiple accelerators in a single server

- Scale outside the box – synchronize multiple servers and sites into a total solution

- Mix-and-match speeds without changing software application – save R&D costs

- Mix-and-match multiple applications in the same server – proprietary or Open Source– and offer more to your customers

Seamless and easy!
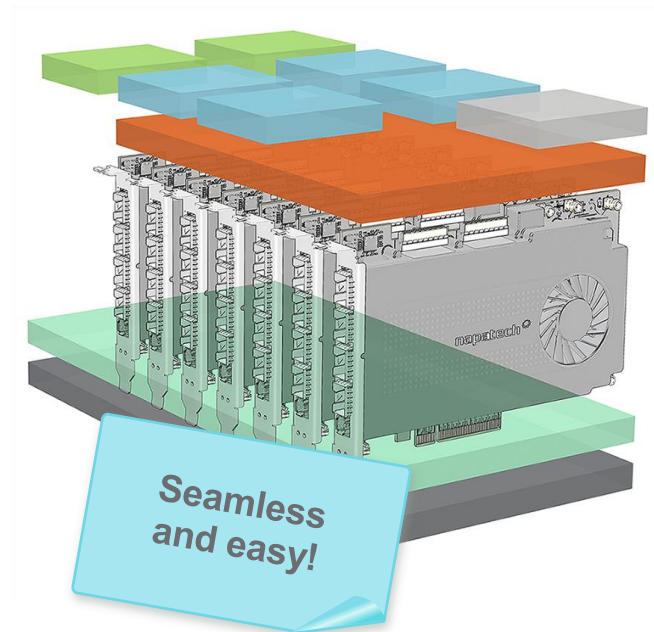
SOLID FOUNDATION FOR GROWTH

- Strong brand and a loyal customer base

- Award-winning portfolio

- At the forefront of 100 Gigabit – the next big wave

- Powerful architecture – scaling to Terabit performance

- Fueling our business now and provides a strong foundation for future growth
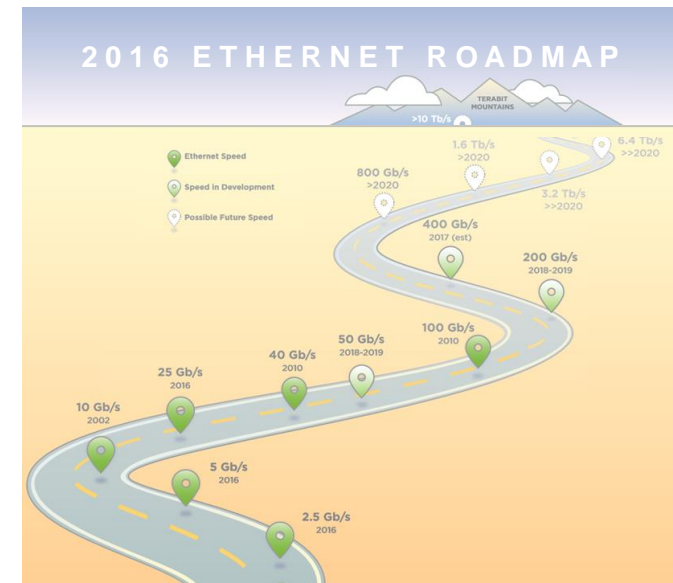
Source: Ethernet Alliance, 2016

QUESTIONS ?

NAPATECH
NETWORK RECORDERS

SMARTER DATA DELIVERY
ON DEMAND

When you analyze in real time you know what you are looking for, but sometimes you do not – you will need to analyze the data later.

Using a Network Recorder you can perform Packet Capture in real time and simultaneously store the data for on-demand analysis.

This allows you to select the critical data to be analyzed and deliver them efficiently to the right analysis application.

Think – Smarter Data Delivery

**RECORDER
SOLUTIONS**

NAPATECH PANDION RECORDER

- Captures high speed data and guarantees fast retrieval **on demand**

- Enhances solutions for identifying and solving cyber security and network performance issues

- On-demand network recording is applicable across many verticals with multiple applications in various industries

- Think of a black box recorder on a plane

SECURITY – SOME SCARY STATISTICS
HUGE IMPACT ON THE BOTTOM LINE

66% of breaches remain undiscovered for months or more …

Approximately 70% of breaches were discovered by external parties who then notified the victim

JPMorgan Chase, 2014 83 million accounts – 76 million households and 7 million small businesses compromised. Considered one of the largest data breaches in history

Sony, 2011 Intrusion exposed 100 million Sony PlayStation customers. Result was a 23-day closure and 171 MUSD in cost

Source: Verizon 2013 Data Breach Investigations Report, Ponemon Institute

ADDRESSING TOUGH CHALLENGES
SECURITY

- When you suffer a breach, how many days of data do you have to determine the issue

- How does your security teams quickly resolve whether a breach actually occurred or was just a false alarm

- How do you determine the precise extent of the damage to estimate your cost and liabilities

- Even though you have locks and alarms on doors, you would not leave a vulnerable area without video surveillance – how can you get the same level of assurance for your critical data

CUSTOMER CASE
GOVERNMENT SECURITY DEPARTMENT

The market challenge

- The security team needed a next-gen solution that provided visibility, detection, and analysis of network traffic, with scalable storage

- The key was to integrate all of these solutions for quick analysis of real-time events while keeping the network operational
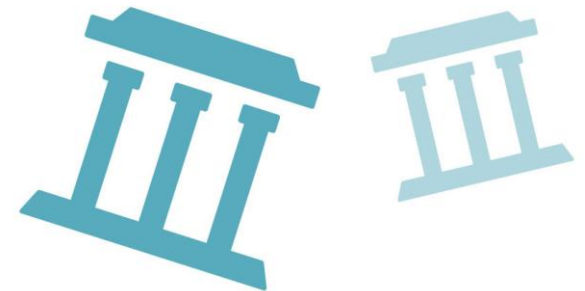
CUSTOMER CASE
GOVERNMENT SECURITY DEPARTMENT

The customer solution

- Capture traffic and index it for quick retrieval

- Aggregate traffic from multiple links into a single appliance with onboard storage capability

- Enable a way to replay traffic outside of hours

- Allow access to Rest API for easy presentation of industry-standard pcap-formatted files

The benefits using Napatech

- 100% on-demand network data visibility

- Precise replay

- Open standard integration with third party applications
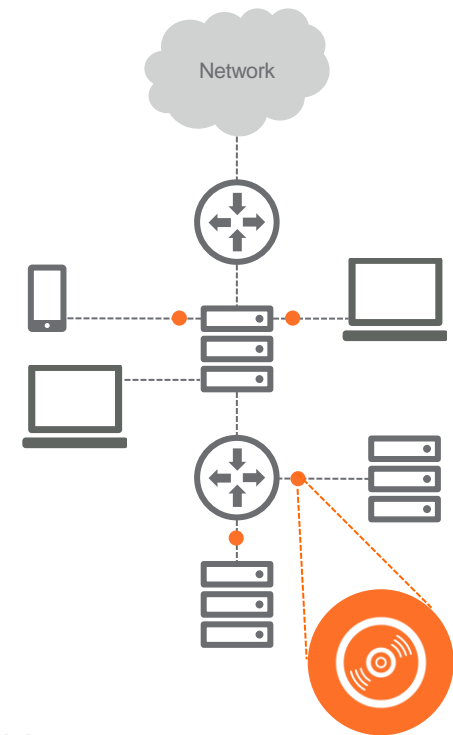
ADDRESSING TOUGH CHALLENGES
FINANCIAL

- How do you show that your trading algorithms have been improved against the market data of a prior trading day

- How do you verify reception and authentication of trades

- How do you prove when a trade was made, even if the trading server may have malfunctioned

- Can you measure your global arbitrage in nanoseconds, even in different hemispheres

CUSTOMER CASE
GLOBAL INVESTMENT BANK

The Market Challenge

- This global financial services firm relies on its network to deliver market-leading securities, asset management and credit services to its clients

- Network outages can mean lost or delayed trades costing them customers and money

CUSTOMER CASE
GLOBAL INVESTMENT BANK

The customer solution

- Provides a non-proprietary capture format for an open source network analytical application

- Provides cost effective, ultra high speed packet capture in an open format with an integrated web-based API

The benefits using Napatech

- Cost effective appliance solution

- Nano-second timestamping

- High speed network recorder solution
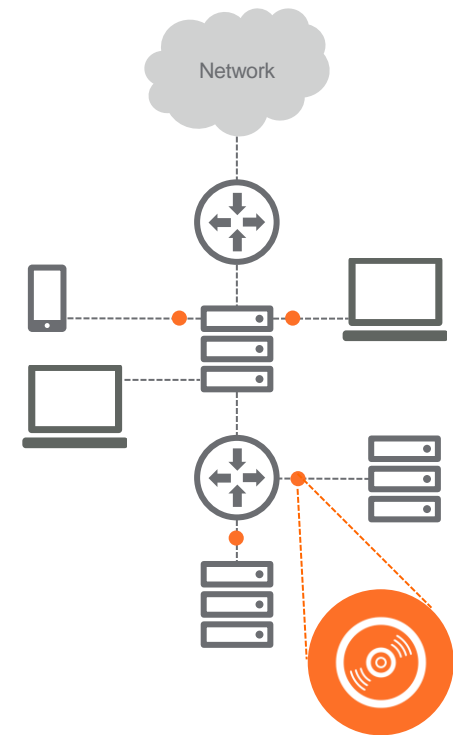
Network

LATEST DEVELOPMENTS
DRIVING NETWORK RECORDER GROWTH

- Cyber Security breaches

- Regulatory and compliance

- Replay functionality for trade algorithm verification

- Ease of integration with customer and Open Source applications

UNIQUELY POSITIONED TO SUCCEED

- Network Recorder solutions, securing full packet capture on demand are applicable to all industries where data is critical and Smarter Data Delivery is a must

- Napatech has a long history enabling large well known OEMs and partners

- The Napatech Pandion is a further extension to the industry proven accelerator technology

- Providing industry standard open formatting rather than proprietary delivery of critical data

- Every organization needs smarter data deliver to mitigate the risks that the they are facing daily

QUESTIONS ?

NAPATECH
VIRTUALIZATION SOLUTIONS

SMARTER DATA DELIVERY
VIRTUALIZED

Unlike physical networks where network function software and hardware are closely integrated and data is delivered from one box to the next, in virtualized networks, software is virtualized and separated from the hardware.

VIRTUALIZED NETWORKS

Data is delivered from one virtualized network function to the next. These virtual functions can be hosted on any server in the datacenter and can be moved.

Ensuring that each virtual function gets the right data, at the right time in the right place even at high speeds is the challenge that Napatech virtualization solutions address.

Think – Smarter Data Delivery

UNDERSTANDING NETWORK VIRTUALIZATION
A COMPARISON WITH SHIPPING

In the past cargo delivered in different packaging
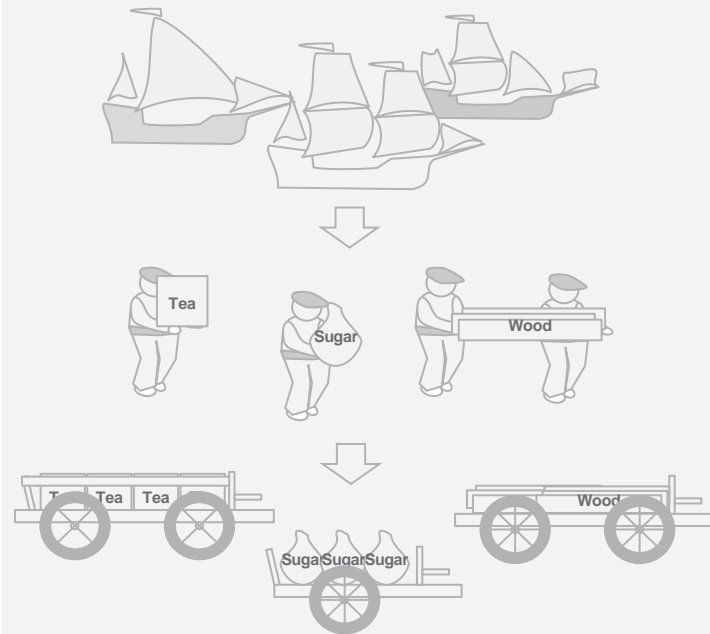
| Proprietary | Manual | Slow | Costly |

Invention of container standardized cargo delivery
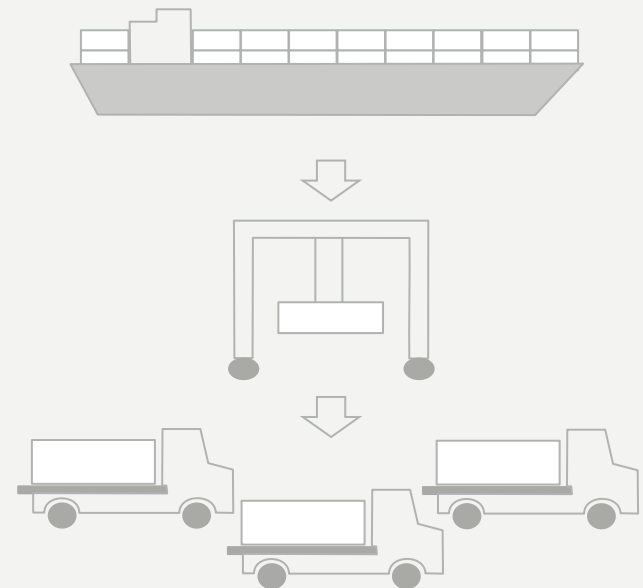
| Standard | Automated | Fast | Cost effective |

UNDERSTANDING NETWORK VIRTUALIZATION
IN TELECOMMUNICATIONS

Today, network data delivered using proprietary systems

Network Function

Network Function

Network Function

Network Function

Network Function
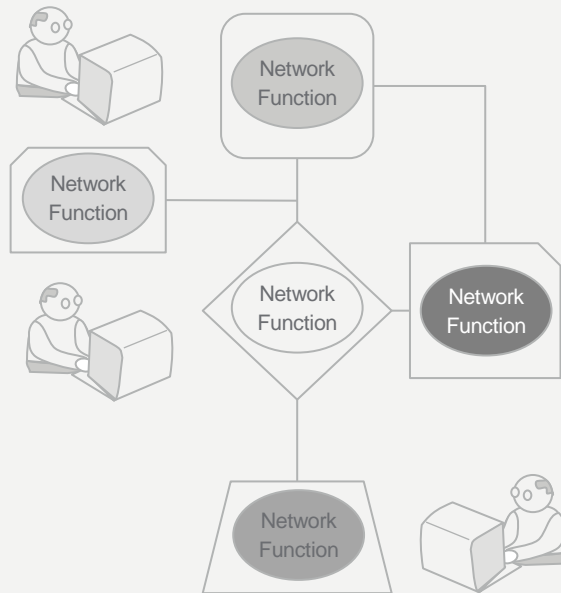
Proprietary	Manual	Slow	Costly

Virtualization provides a standardized "container"

Centralized and Automated
Management and Orchestration (MANO)

Network Function	Network Function	Network Function
Virtual "Container"	Virtual "Container"	Virtual "Container"

Standard Server Hardware
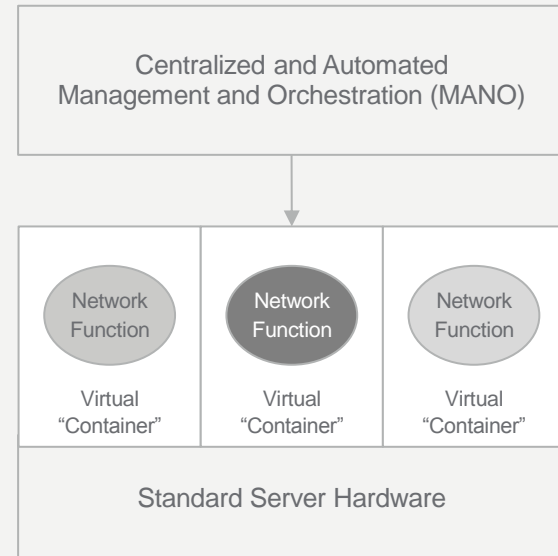
Standard	Automated	Fast	Cost effective

VIRTUALIZATION ENABLES AUTOMATION
DEPLOY SERVICES FASTER AND CHEAPER

- A service is built by chaining together network functions
- Management and Orchestration (MANO) interprets service chain
- MANO deploys network functions on available servers
- Enables easy definition of services, fast deployment and continuous optimization

Service Chain

Network Function — Network Function — Network Function — Network Function

Management and Orchestration (MANO)

Network Function
Virtual "Container"

Network Function
Virtual "Container"

Network Function
Virtual "Container"

Network Function
Virtual "Container"

Standard Server Hardware

Standard Server Hardware

Standard Server Hardware
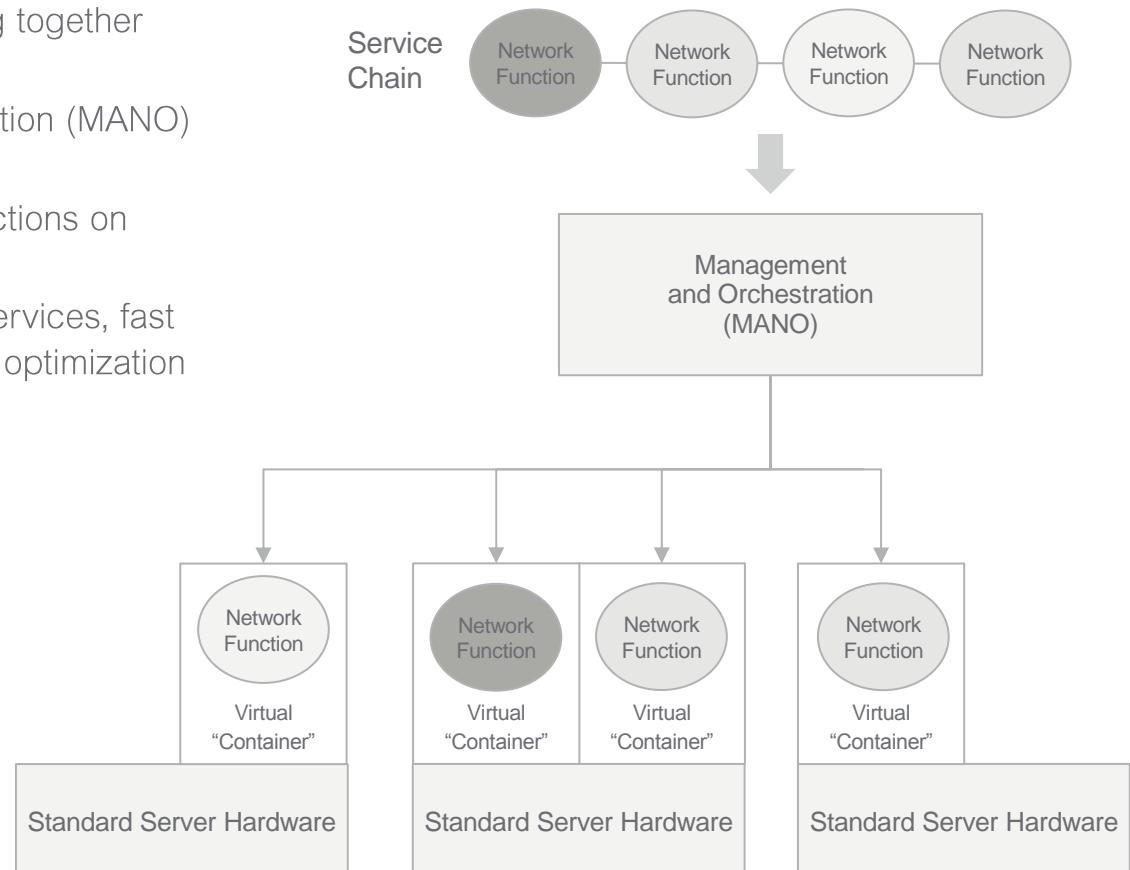
NETWORK FUNCTIONS VIRTUALIZATION
BIG EXPECTATIONS BUT GROWING CHALLENGES

**NFV a hot topic in Telecom
for the last 3 years**

**Now there is doubt
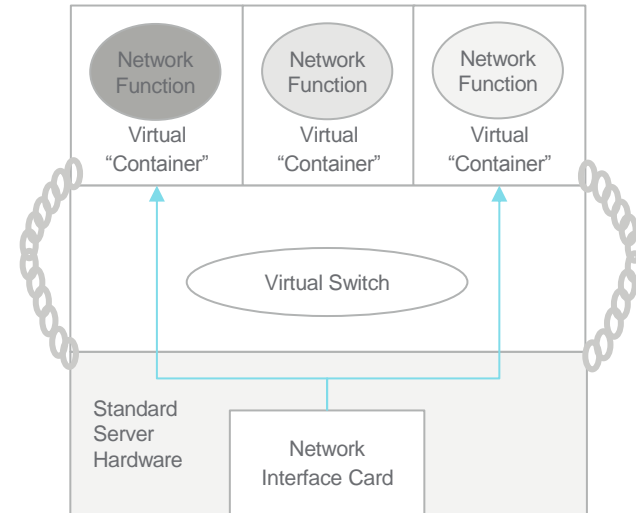that NFV can deliver on its promise**

ONE CRITICAL NFV CHALLENGE
DATA DELIVERY WITH MOBILITY

Current solutions for delivering data to virtualized network functions either not fast enough or will not allow virtualized network functions to be moved.
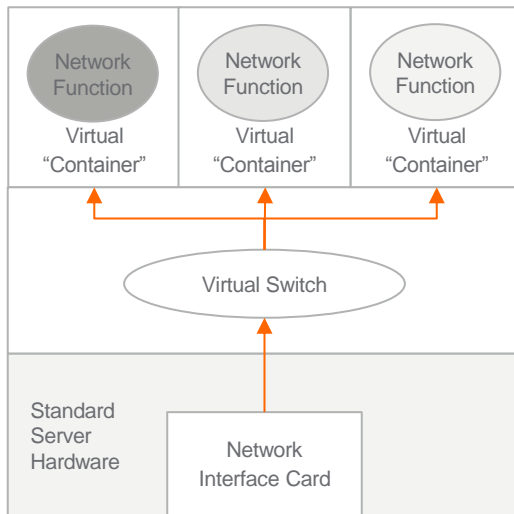
Standard Network Interface Cards
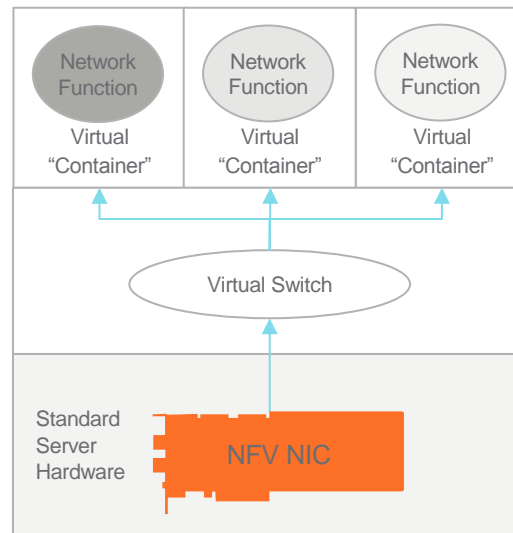leading to loss of data
not fast enough

Solution today is to bypass
virtual switch, but this means functions
cannot be moved

NAPATECH VIRTUALIZATION SOLUTION
DELIVERING ON THE NFV PROMISE

- New Network Interface Card designed for NFV

- Provides full performance and ability to move virtual network functions

- 8 MUSD savings in a 10,000 server data center.
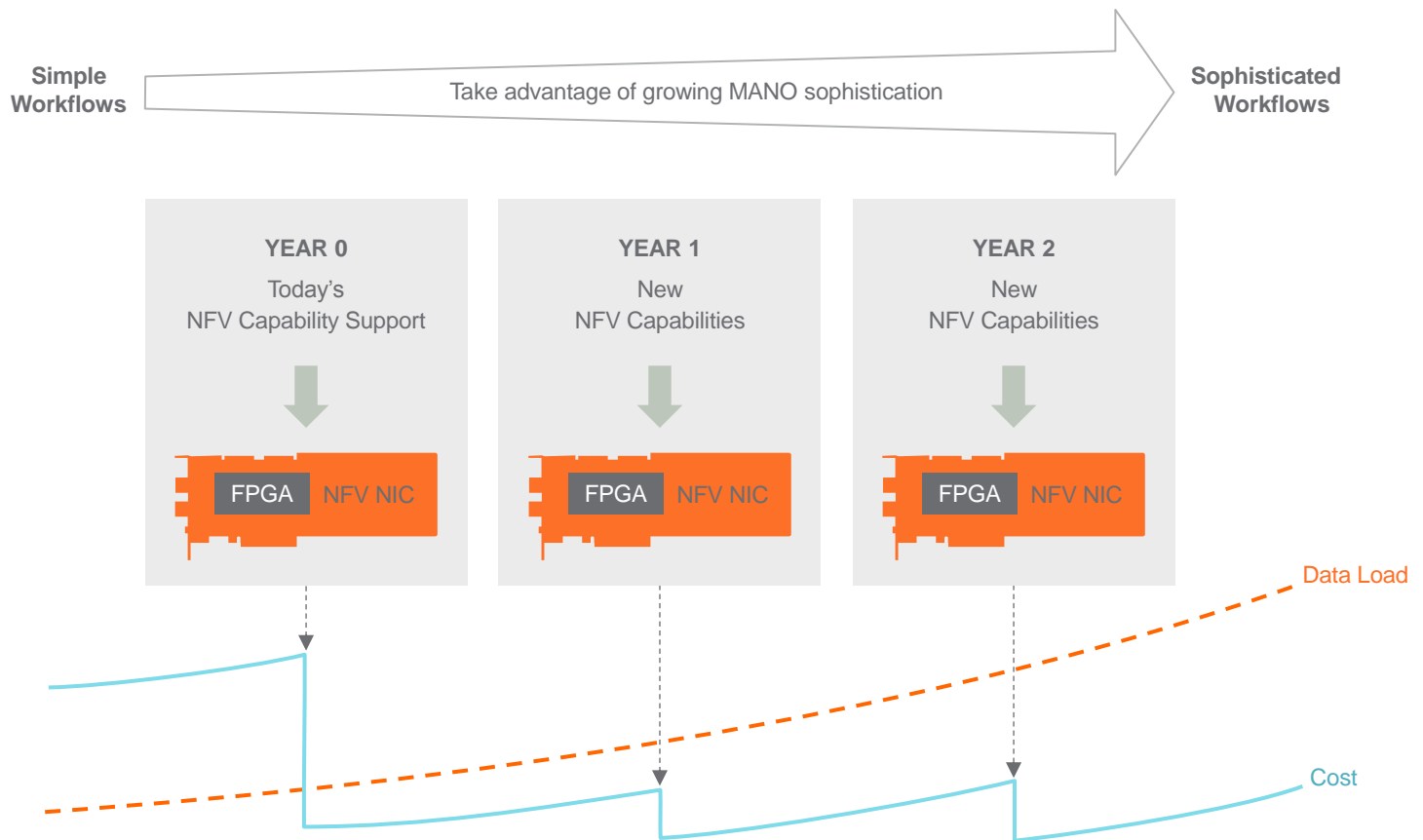
7X

Better Data
Delivery

Network Function	Network Function	Network Function
Virtual "Container"	Virtual "Container"	Virtual "Container"

Virtual Switch

Standard Server Hardware — NFV NIC

8X

More Software
per Server

**Enables Virtual Switch
to run at full capacity**

NAPATECH SECURING THE NFV FUTURE
CONTINUOUS COST EFFICIENCY

Simple
Workflows

Take advantage of growing MANO sophistication

Sophisticated
Workflows

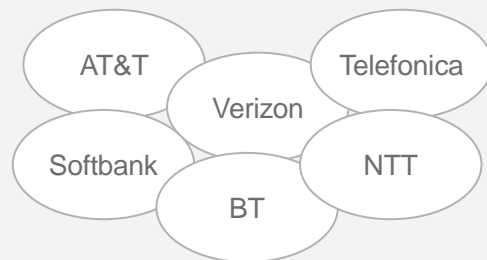| YEAR 0	YEAR 1	YEAR 2
Today's NFV Capability Support	New NFV Capabilities	New NFV Capabilities
FPGA NFV NIC	FPGA NFV NIC	FPGA NFV NIC

Data Load

Cost

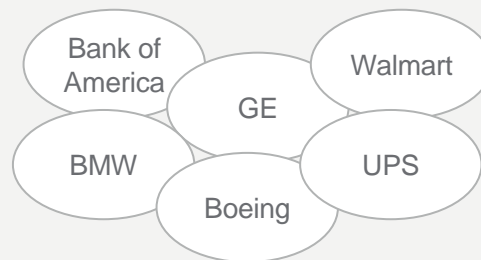# THE NFV LANDSCAPE AND KEY PLAYERS
BROADEN OUR OPPORTUNITIES

Smarter Data Delivery for Virtualized Environments
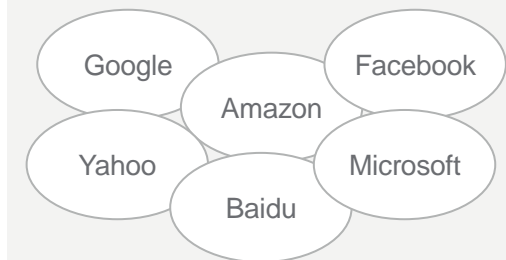
Napatech NFV NIC Market Characteristics

- General market
- Low margin
- High volume

AT&T · Telefonica · Verizon · Softbank · NTT · BT

Telecom NFV Market

Bank of America · Walmart · GE · BMW · UPS · Boeing

Enterprise Data Center Market

Google · Facebook · Amazon · Yahoo · Microsoft · Baidu

Hyperscale Data Center Market

Nokia · Huawei · Cisco · Dell · Ericsson · NEC · Brocade · HP Enterprise · •••

NFV and IT Infrastructure Vendors

NAPATECH NFV NIC SOLUTION
DELIVERING ON THE NFV PROMISE

- First presentation of NFV NIC solution
- Engaged with several leading
  NFV infrastructure vendors
- Unanimous approval and excitement

- Now engaging with selected
  market-leading NFV infrastructure vendors
- Using co-creation approach enabling
  customers to add their requirements
- These engagements will define general
  market product and fuel future growth

QUESTIONS ?

napatech

NAPATECH
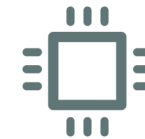## AMBITIONS TOWARDS 2020

NAPATECH MARKET INSIGHTS
PROMISING GROWTH PLATFORMS

The combined potential towards 2020 building upon our Accelerator, Recorder and Virtualization solutions is huge and clearly shows a very attractive market size

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RECORDER SOLUTIONS

+6,000 MUSD

NETWORK FUNCTION VIRTUALIZATION – NEW OPPORTUNITIES

NFVI market is estimated to 300 MUSD in 2015 and are expected to grow to +6,000 MUSD by 2020***

VIRTUALIZED NETWORKS

TAKING NAPATECH TO 100 MUSD IN 2020
SMARTER DATA. DELIVERED.

- We expect that the 3 business areas just presented secure our objective of a long term strategic position based on multiple growth platforms and major trends within mobile, security and virtualization

- In addition, we are strengthening our innovation capabilities and processes to expand the application of Napatech technology solutions in new markets

- We strongly believe that the combination of our promising strategy, attractive market size and firm execution qualifies our ambition to be the number 1 vendor for "Smarter Data Delivery Solutions", providing a 100 MUSD top-line by 2020
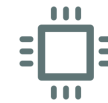
MARKET LEADER IN ACCELERATOR SOLUTIONS

MARKET LEADER FOR NETWORK RECORDER SOLUTIONS

FRONT-RUNNER IN ACCELERATING VIRTUALIZED SOLUTIONS

THOUGT LEADER DRIVING EXEPTIONAL NEW INNOVATION

LEADING EDGE CORE TECHNOLOGY PLATFORM

WE HAVE A GREAT BASELINE FOR A
FANTASTIC JOURNEY INTO THE FUTURE

MARKET LEADER IN ACCELERATOR SOLUTIONS

MARKET LEADER FOR NETWORK RECORDER SOLUTIONS

FRONT-RUNNER IN ACCELERATING VIRTUALIZED SOLUTIONS

THOUGT LEADER DRIVING EXEPTIONAL NEW INNOVATION

NTT IT

Symantec

Hewlett Packard Enterprise

ca technologies

IBM

SK telecom

CISCO Lancope

ROHDE&SCHWARZ

CLEAR STRATEGY

STRONG SOLUTIONS

BEST CUSTOMERS

GREAT EMPLOYEES