Design for the RAS challenges of NFV

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NFV now is the mainstream in Telecom





 Hardware development large barrier to entry for new vendors, constraining innovation & competition.

Network Virtualisation Approach

Members from CT and IT are working together: Carriers: AT&T、Verizon、BT、FT、DT、 Vodafone, Telefonica, TI, Century Link

CT Vendors:

Huawei, Fricsson, Alcatel-Lucent, NSN_N NFC

IT Vendors:

HP、intel、IBM、CISCO、Juniper.....

Decoupled HW/SW, COTS hardware, Virtualization, Openness, Portability / Interoperability, Elasticity / Scalability, Orchestration, Automation



Huawei is Working together with Industry to enable NFV

Reliability & Availability working group is still a dedicated WG for phase 2
Huawei actively engaged in and make key contributions.



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NFV Challenges for example......Far more about Function





Challenges are Real !

- ✓ "715 hours of downtime across 51 major events in 2014" CloudEndure, 1/14/2015
- ✓ "Verizon upgrade triggers 40-hours cloud service outage" Fierce Telecom,, 1/12/2015
- ✓ "Google Compute Engine, AOL Mail Suffer Early Morning Outages", DataCenterKnowledge, 2/19/2015
- ✓ "Google suffers new cloud outage, promises to be "better prepared" "SiliconANGLE, 3/9/2015
- ✓ "£17m: Cost of Apple 12-hour cloud outage", CloudHUB, 3/12/2015
- ✓ "JetBlue Computer Outage Causes Major Check-In Delays" NBC News, 3/30/2015

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- Data center outage: overall average cost of \$505,502 per incident, more than \$5,000 per minute, 2/1/2011, Ponemon Institute
- Top ten cloud outages of 2013 accounted for a whopping revenue loss more than \$31Million
- The number of Cloud outages rise quickly with the growth of cloud services, CSA,2013

Provider	2014 Downtime(hrs/yr)
Amazon Web Service	2.41
Joyent	2.6
Google Cloud Platform	4.46
Rackspace Cloud	7.52
Microsoft Azure	39.77



% responding 3, 4 or 5

Performance

On-demand paym't model may cost more Lack of interoperability standards

Bringing back in-house may be difficult Hard to integrate with in-house IT Not enough ability to customize

Source: IDC Enterprise Panel, 3Q09, n = 263

Q: Rate the challenges/issues of the 'cloud'/on-demand model



Ready for

Mission

Critical?

99.999%?



Source: CloudHarmony

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Build HA by Software?







Our Practice for new RAS challenges

Some of our Design Practice for the new challenges:

- FC-DFR-----Feature Centered DFR
- DMFA-----Data Mining Failure Analysis
- SDA------ Software Defined Availability
- **DFD-----**Design for Durability, from Availability to Durability





New Way for New Challenges——DMFA



Predictive/Proactive-----Silent Failure / Missed Probes Degradation Failure False Alarm



New Way for New Challenges——SDA

- Service Differentiation does exist
- Customer Req. differentiation does exist
- Resource Differentiation does exist (HW 10X better than AVG.)
- Network condition dynamically changes and NFV makes it more frequently

Service Availability will be defined on a service basis, but a single service may have different levels of Service Availability (different sets of parameter thresholds). For example, in a large-scale disaster situation, the network operator may decide to prioritize the voice call service over on-line gaming by shifting all the resources available to the voice call service, in which case, the Service Availability for the on-line gaming will be different than that in the normal situation.

Service Name (not exhaustive list)	Service Availability Level	Service Attribute	Grade of Service Availability		
Emergency telecommunications	Level 1	Continuous	Single grade		
Financial transactions	Level 1	Transactional uninterruptible	Single grade		
Video call service*	Level 2	Continuous	l Video +Voice	II Image +Voice	III Voice only
Voice call service	Level 2	Continuous	Single grade		
Web browsing* (non real-time)	Level 3	Transactional	I Full cont	ents	II Only text and image
Streaming video	Level 3	Continuous (resumable)	Single grade		
Interactive gaming	Level 3	Continuous		Single gra	de
	Source.	: ETSI GS	NFV	RELO	21







[[]Req.4.2.8] NFV frameworks shall ensure that not all services need to be "built to the peak", but Service Level Agreements (SLAs) can be defined and applied according to given resiliency classes.

New Way for New Challenges——DFD

- Data Loss could be a more serious issue -----Data Durability!
- 0.07% of the volumes lost permanently during one Amazon outage in 2011.
- My Case



Source: EMC Globe data protection index, 2014.12

99.99999999999% ?





Enabling NFV——The Reliable Way to Accelerate It



All-IP drives the telecom industry In past 10 years and take years for IP's from IT to Telecom.

To meet with carrier grade, fault detection and Failover technologies should be improved for Telecom application:

- BFD、enhance OAM, etc. : faster fault detecting ,less than 50ms (Vs. seconds before)
- E-VRRP , IGP FC, MPLS FRR etc.: faster failover, in hundreds microseconds (Vs. seconds before)

- NFV is irristible, and Carrier-Grade is Must-have but Harder
- > Learn from lessons and make it happen ASAP !

Huawei's Best Practice of Telecom RAS Design

Lessons from history and IT

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Carrier Grade NFV ASAP!



Thank you

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