

HP FlexFabric, конвергентные решения для ЦОДов на базе коммутаторов 5900 серии



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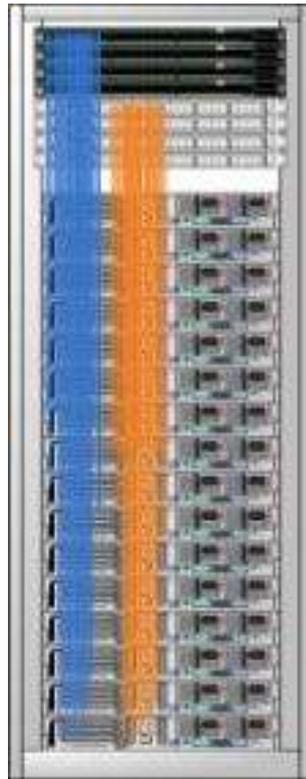
Сентябрь 2014

Конвергентное решение HP для СХД



Зачем нужна конвергенция?

- Упрощение сети на доступе
- Снижение числа адаптеров в серверах, физических соединений и портов АСО
- Упрощение архитектуры ЦОД
- Повышение гибкости ИТ за счет упрощения развертывания
- Greener Data Center (снижение энергопотребления)
- Снижение затрат CapEx and OpEx



Separate Networks



Converged



HP FlexFabric 5900CP switch



- Converged ports for Ethernet & FC storage traffic
 - Direct FC storage or FC fabric connectivity
 - Native FCoE, or NPV/NPIV support
 - Wire speed 1/10GbE and 4/8G FC
 - Ultra low latency 40GbE uplinks
- Comware v7 modular operating system
 - 48 converged ports
 - 1/10GbE and/or 4/8 FC
 - 4* 40GbE QSFP+ ports
 - 16*10GbE ports with breakout cables
 - 10GbE Latency < 1.5 μ s (64B packets)
 - 1.28 Tbps switching capacity
 - 952.32 Million PPS throughput
 - 9 switches IRF fabric
 - F/B or B/F airflow for data center deployments



Конвергентный оптический модуль HP SFP+ 16/8/4G FC или 10GE

8/16GbFC / 10GbE converged optics

- Single transceiver that supports both 8/16Gb FC or 10GbE Ethernet communication depending on how it is software controlled through eeprom settings

Advantages:

Allows flex port capability without replacement of SFPs

- Saves customer cost and improves investment protection – Buy once
- Wire it once – Customers don't like to hot-plug SFPs
- Improves reliability – no pulling SFPs and recabling
- Supported with HP Intelligent Infrastructure Analyzer Software

H6Z42A



1st to
market with
converged
optics

Support:

- ✓ 5900CP FCoE switch

Поддерживаемые FlexFabric 5900CP трансиверы

SKU#	Description
H6Z42A	HP Converged Optic SFP+ 16/8/4G FC; 10G
AJ718A	HP Fibre Channel Short Wave Optic 8/4/2G FC Transceiver
AW584A	HP 8Gb Long Wave 10km Fibre Channel SFP+ 1 Pack Transceiver
AJ907A	<i>8 Gbps Long Range Optical Transceivers (SFP+)</i>

Also supports are ALL 10/40 SFP+ & QSFP+ cables used by HP 5900 switches



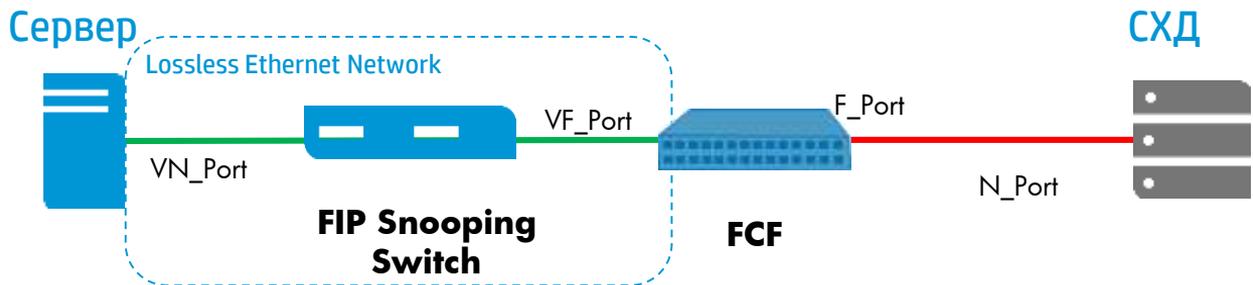
Режимы FC/FCoE функционирования 5900AF/CP

Switch/Mode	FC forwarder / Switch Mode	NPV mode / Gateway Mode	Transit Mode / FSB mode
Definition	<ul style="list-style-type: none"> • Full FC Switch functionality (F/E/N_Ports) • Supports FC fabric services • FC/FCoE encapsulation 	<ul style="list-style-type: none"> • DCBX-PFC-ETS • Needs a SAN switch • Presents a NPIV N_Port to FC fabric • Does not implement FC fabric services 	<ul style="list-style-type: none"> • Snoop the FCOE Initialization Protocol (FIP) • Dynamic ACLs • DCBX-PFC-ETS • Needs FCF
Platforms	HPN 5900CP/AF HPN 12500/12900/11900*	HPN 5900CP/AF 6125XLG	HPN 5900CP/AF 6125XLG



Режим FIP Snooping Bridge (FSB)

Терминология FC/FCoE



FC	FCoE	
N_Port	VN_Port	Node/Host
F_Port	VF_Port	Fabric Port

FSB needs a FCF per FC-BB-5 in order to talk to other FC/FCoE storage and devices

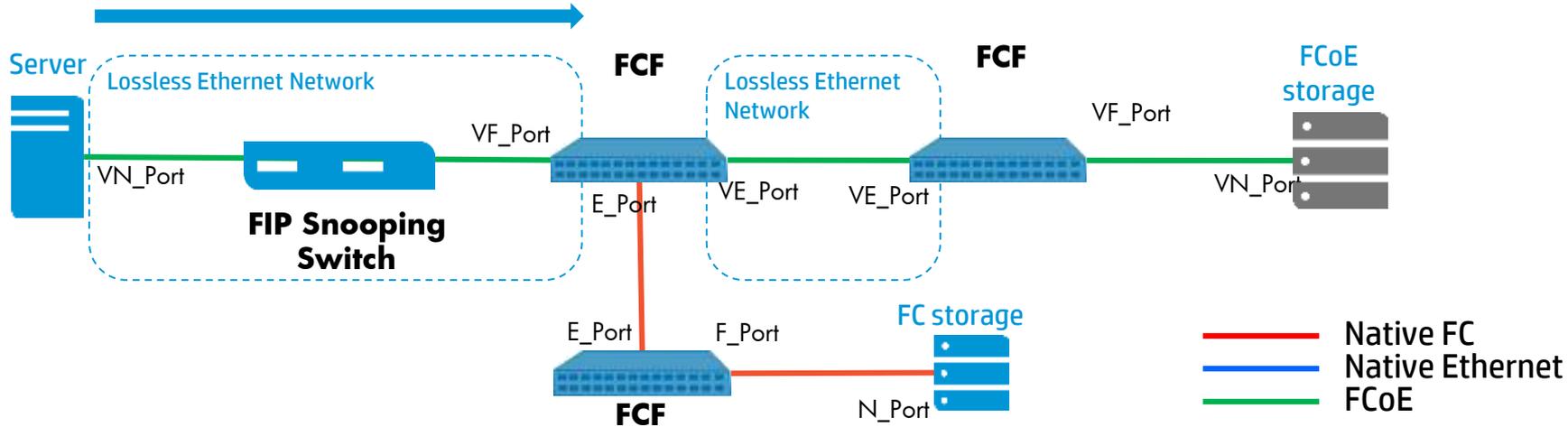
— Native FC
— Native Ethernet
— FCoE



Режим Fibre Channel Forwarder (FCF)

Терминология FC/FCoE

FIP



FC	FCoE	
N_Port	VN_Port	Node/Host
F_Port	VF_Port	Fabric Port
E_Port	VE_Port	Expansion Port between FCF's

FCF can talk to storage or target directly.
FCF can have multiple hops, it can talk to FSB and NPV mode switches



FCF and FSB (FC-BB-5)

Fibre Channel Forwarder (FCF)



- Supports FC Services
 - Name Server
 - Fabric Server
 - Zoning
- FC/FCoE encapsulation
- Is compliant with FC-BB-5, FC-SW, FC-GS, FC-LS, FC-FS etc.
- Direct attach with storage, hosts, FCF switches
- 5900CP, 5900AF, core switches

FIP Snooping Bridge (FSB)



- No FC services
- FIP Aware
- DCBX
- PFC
- ETS
- **Must have up stream FCF**
- 5900, VC and 6125 can work in FSB mode

FC NPIV and FC NPV

N-PORT IDENTIFIER VIRTUALIZATION

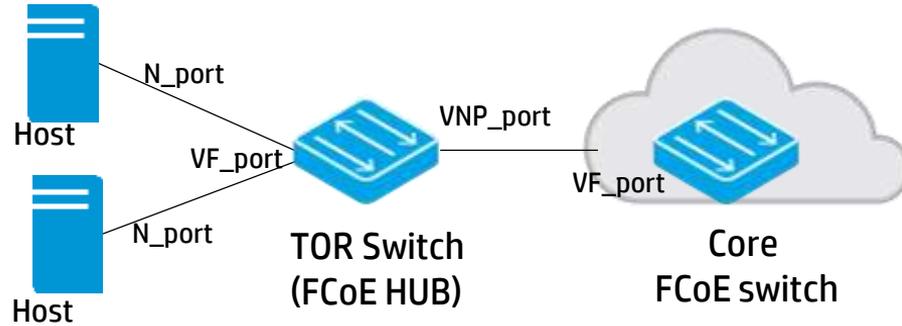
- Mechanism that allocate multiple FC_ID to one N-Port.
- Multiple application can share one HBA
- Allow deployment of different WWPN for different access control, zoning and port security to different application

N-PORT VIRTUALIZATION

- NPV switch uses NPIV, makes NPV switch to set up multiple logins with FCNPIV core switch.
- Server connecting to NPV switch login to NPIV core switch
 1. NPV switch “FLOGI” to core switch.
 2. NPV switch convert the subsequent FLOGI from Server to FDISC, and send “FDISC” to core switch
- In NPV mode, no local FC exchange. Usually FC access switch (ToR or Blade) can be configured in NPV mode.
The benefits of NPV:
 - Switch in NPV mode will not occupy Domain ID, high expansibility
 - Switch in NPV mode can cooperate with different vendors.

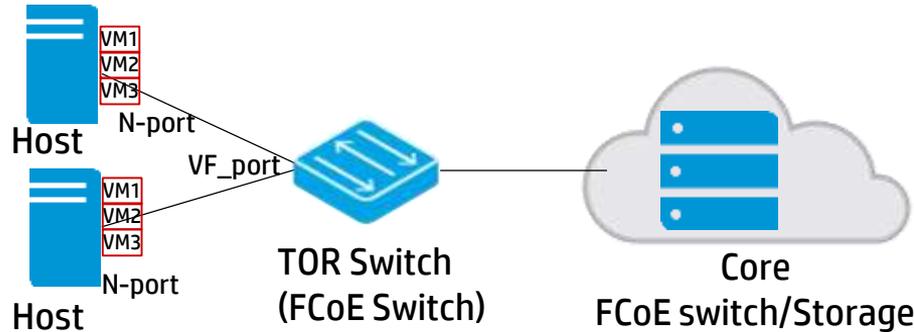


FC/FCoE NPV and NPIV



NPV(N-Port Virtualization) mode

- FC switch domain id resource is limited.
- NP_Port connects to an F_Port and acts as a proxy for other N-Ports on the NPV-enabled switch.

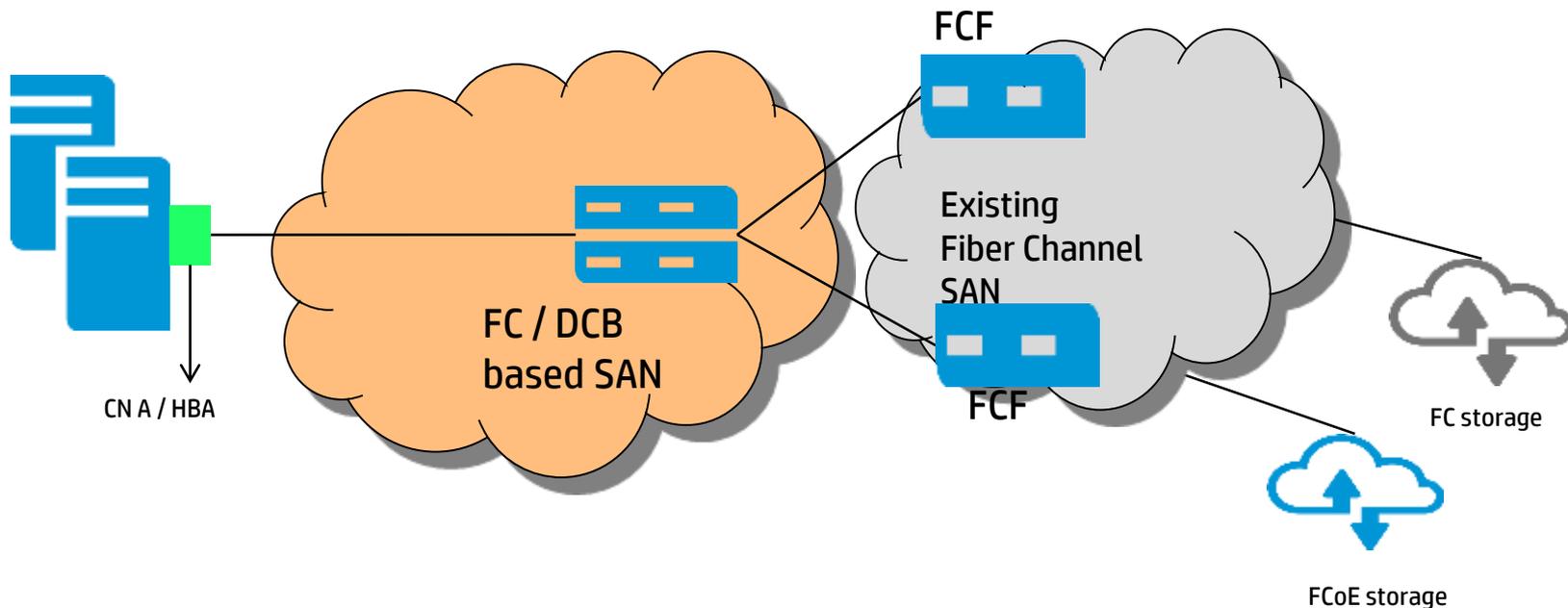


NPIV (N-Port ID Virtualization)

- An N-Port have a single N-Port-ID associated with it.
- One-to-One mapping between WWPN and N-Port-ID.

Для чего нужен NPV mode?

FC industry has very limited interoperability. FCoE environment must be bridged gap between the FC SAN topology and exiting environment.



HP FlexFabric 5900CP FCoE/FC Storage System Support



■ FCoE Storage Systems

- 3PAR StoreServ 10400/10800/7200/7400/7450, P63xx/65xx
- FCoE Storage Systems connect to the HP 5900CP at 10GbE

■ Fibre Channel Storage Systems

- 3PAR StoreServ 10400/10800/7200/7400/7450, 3PAR F200/400, P63xx/65xx, EVA8400/6400, (EVA4x00/6x00/8x00), P9500, P2000(G3)/MSA2040(G4)
- FC Storage Systems connect to the HP 5900CP at 4/8Gb FC

■ Tape Products

- StoreEver: Ultrium 3280 LTO-5 FC (MSL,EML,ESL-G3,ESL-E), Ultrium 3000 LTO-5 HH FC (MSL), Ultrium 6250 LTO-6 HH 8Gb FC (MSL, EML-E, ESLG3)
- StoreOnce: 2700, 4210, 4420, 4430, 4500, 4700, 4900, B6200, 6500 (G3)

■ Third party storage systems not supported by the 5900CP

■ See SPOCK/Streams for latest support listings



HP FF 5900CP FC/FCoE BladeSystem Interface Support

BladeSystem Connectivity (VirtualConnect Blade Modules, Blade Switches)

Refer to the cookbook series <http://www.hp.com/go/blades>

http://h20628.www2.hp.com/km-ext/kmcsdirect/emr_na-c01702940-10.pdf

- Virtual Connect Flex-10/10D, FCoE (FIP Snooping)
- Virtual Connect FlexFabric 10Gb/24-Port (8Gb NPV FC, 10GbE FCoE FIP Snooping Mode)
- Virtual Connect 8Gb 24-Port Fibre Channel Module for c-Class BladeSystem (Brocade access gateway)

- Blade Switch: HP 6125XLG, Ethernet/FCoE (6125XLG in NPV mode, will also support Transit and FCF modes)
- Blade Switch: HP 8/24c SAN Switch (Brocade) (Access gateway or FC switch mode)
- Blade Switch: MDS 8Gb 24-port Switch (Cisco) (feature NPV or FC switch)
- See SPOCK/Streams for latest support listings



Converged Network Adapter

The HP Converged Network Adapters (CNAs) are dual port adapters that provide Ethernet, iSCSI, and Fibre Channel (FC) connectivity over 10 GbE using both Fibre Channel over Ethernet (FCoE) and Converged Enhanced Ethernet (CEE) standards.

CN1000E - Emulex



HP554FLR - Emulex



CN1000Q - QLogic



Deploying the FlexFabric 5900CP

Use with HP & 3PAR storage in converged environments

Converged data centers with FCoE

- New data centers, or new tier-2 applications
- Add to, or upgrade current FCoE environments
- HP 5900CP is qualified with HP CNAs & FCoE storage

10/40GbE data center networks

- Upgrade to 10/40GbE with option to add iSCSI, or FCoE later
- Also consider HP FlexFabric 5900AF switch series
- HP 5900CP is qualified with HP iSCSI storage

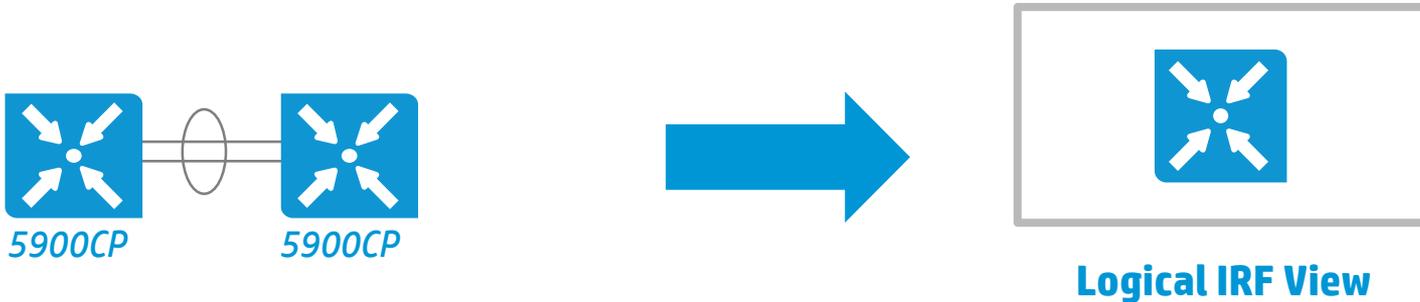
Fibre Channel storage & SANs

- HP 5900CP is qualified with HP CNAs, HBAs, 3PAR and HP FC storage
- Consult your sales representative for tested storage configurations



HP 5900CP – Intelligent Resilient Fabric (IRF)

Scalable, resilient & flexible pay-as-you-grow model



- Up to 9 units IRF Ethernet fabric configuration operate as a single virtual switch*
 - Simplifies network architecture and management with flatter, two-tier networks
 - Vastly improves performance and available network bandwidth with link aggregation and no STP
 - Reduces re-convergence time with distributed configurations
- High-speed 320Gbps stacking using 40G QSFP or 10G SFP+ as stacking ports

*** Consult your sales representative for tested IRF configurations in converged environments**

IRF with FCoE/FC Storage

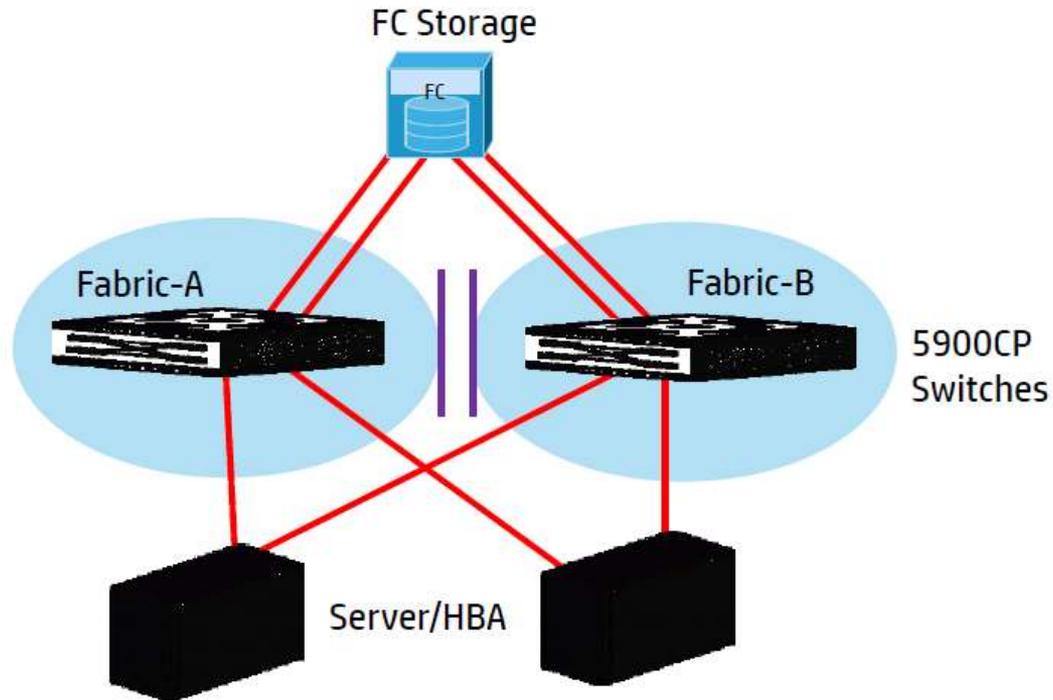
Supported IRF/Storage implementation options

- #1. No IRF usage, traditional storage dual-redundant fabric, physical FCoE/FC air-gap
- #2. Limit IRF usage to “Ethernet connections only” in 2-switch dual-redundant fabric
 - 2 switches – 1 per fabric, logical FCoE/FC air-gap
 - Requires 2 VSANs
- #3. Limit IRF usage to “Ethernet connections only” in 4-switch dual-redundant fabric
 - 4 switches – 2 per fabric, physical FCoE/FC air-gap
 - Requires 4 VSANs
- #4. Allow IRF usage for Ethernet and north-south Storage traffic (IRF not an e-port ISL)
(no physical/logical FC/FCoE air-gap)
 - Must enable PFC (QoS) to support lossless storage traffic over IRF link
 - Congestion avoidance over IRF link must be designed into the configuration
 - Use 40GbE Link Aggregation, initiator-target port distribution, and VFC traffic-mapping
 - 1 VSAN per Fabric A and 1 VSAN per Fabric B – limit of 2 switches per fabric



#1. No IRF, Traditional Storage Dual-Redundant Fabrics

Air-gap, physical separation between fabrics



#2. IRF with FCoE/FC Storage, 2 Switches

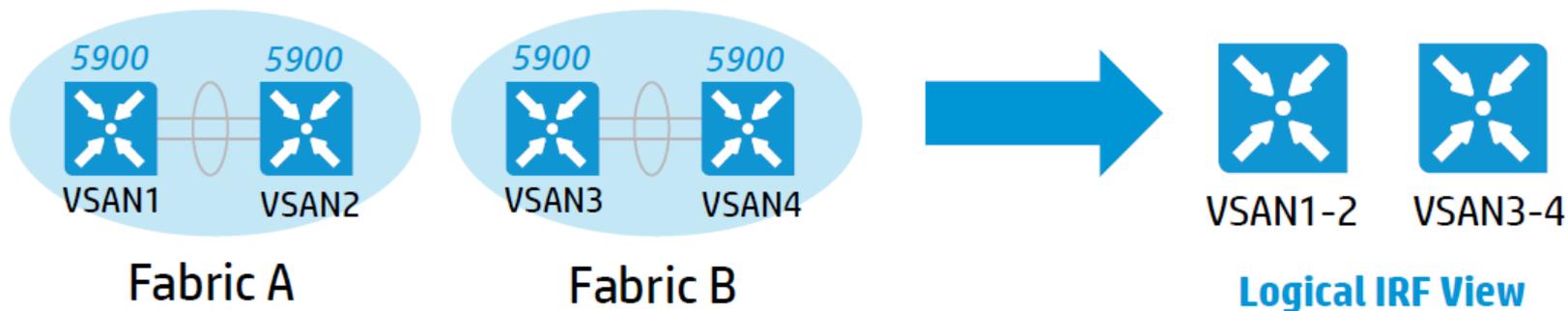
IRF implemented across fabrics, 1 switch per fabric



- IRF configuration appears as a one virtual switch across 2 fabrics
- Ethernet connection across IRF link
- 2 VSANs, limit storage traffic to each VSAN, no storage traffic over IRF
- Logical FCoE/FC air-gap between fabrics

#3. IRF with FCoE/FC Storage, 4 Switches

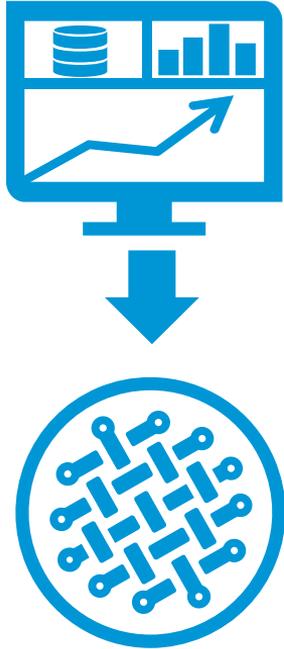
IRF implemented within each separate fabric, not across fabrics, 2 switches per fabric



- IRF configuration appears as a one virtual switch per fabric
- Minimum of 4 VSANs (up to 16 allowed)
- Limit storage traffic to each VSAN, no storage traffic over IRF
- Must be specific on device placement to allow desired access (CNA to storage, etc.)
- Physical FCoE/FC air-gap between fabrics

IMC VAN Fabric Manager

Industry's first tool that manages TRILL/SPB, FCoE/FC



Orchestrate network fabrics

- Supports HP FlexFabric 5900CP converged switch
- Unified DCB and FCoE converged management
- Unified SPB, TRILL, and IRF fabric management
- Manages across geographically dispersed locations with HP Ethernet Virtual Interconnect (EVI)
- VMware vMotion playback

HP FlexFabric 5900CP switch series

Ordering information

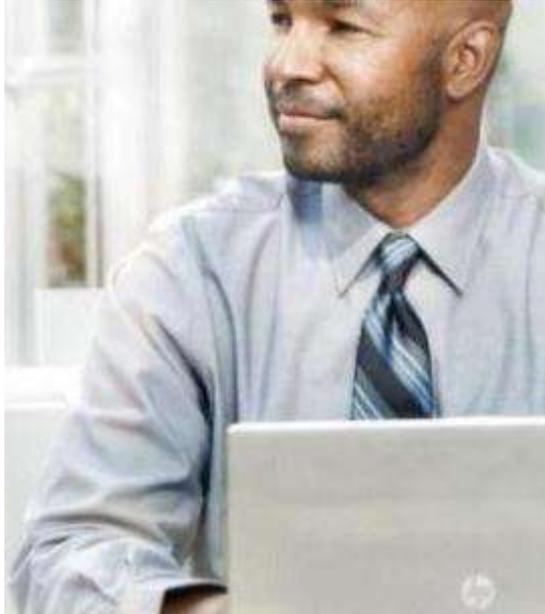


SKU	Description
JG838A	HP FlexFabric 5900CP top-of-rack switch
JC680A	AC power supply
JC681A	DC power supply
JC682A	Back-to-front fan tray
JC683A	Front-to-back fan tray
H6Z42A	HP StoreFabric 4/8/16GFC/1/10GE 100m SFP+ XCVR transceiver (available on storage price list)



HP FlexFabric 5900CP optics

HP FlexFabric 5900CP supported optics



SKU	Description
H6Z42A	HP StoreFabric 16/8/4G FC & 1/10GE 100m SFP+ XCVR transceiver (available on storage price list)
AW584A	HP 8Gb Long Wave 10km Fibre Channel SFP+ 1 Pack Transceiver
AJ718A	HP Fibre Channel Short Wave Optic 8/4/2G FC
JG329A	1m 40GE to10GE splitter cable
JG330A	3m 40GE to10GE splitter cable
JG331A	5m 40GE to10GE splitter cable

Also supports ALL 10/40 SFP+ & QSFP+ cables used by HP 5900 switches



HP's licensing simplicity

- **Out of box simplicity:** HP switches are delivered fully licensed for all network OS features
- **No hidden costs:** no additional licenses are required to get full L2/L3 and IPv4/IPv6 dual stack, IRF, DCB, TRILL, VEPA, FC, or FCoE support
- **True convergence:** no additional license required to enable converged ports or convergence protocols. All 48 ports are active and ready to use

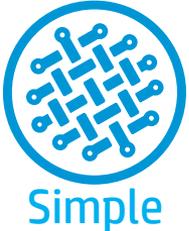
NO additional
network OS license

~~SKUs~~



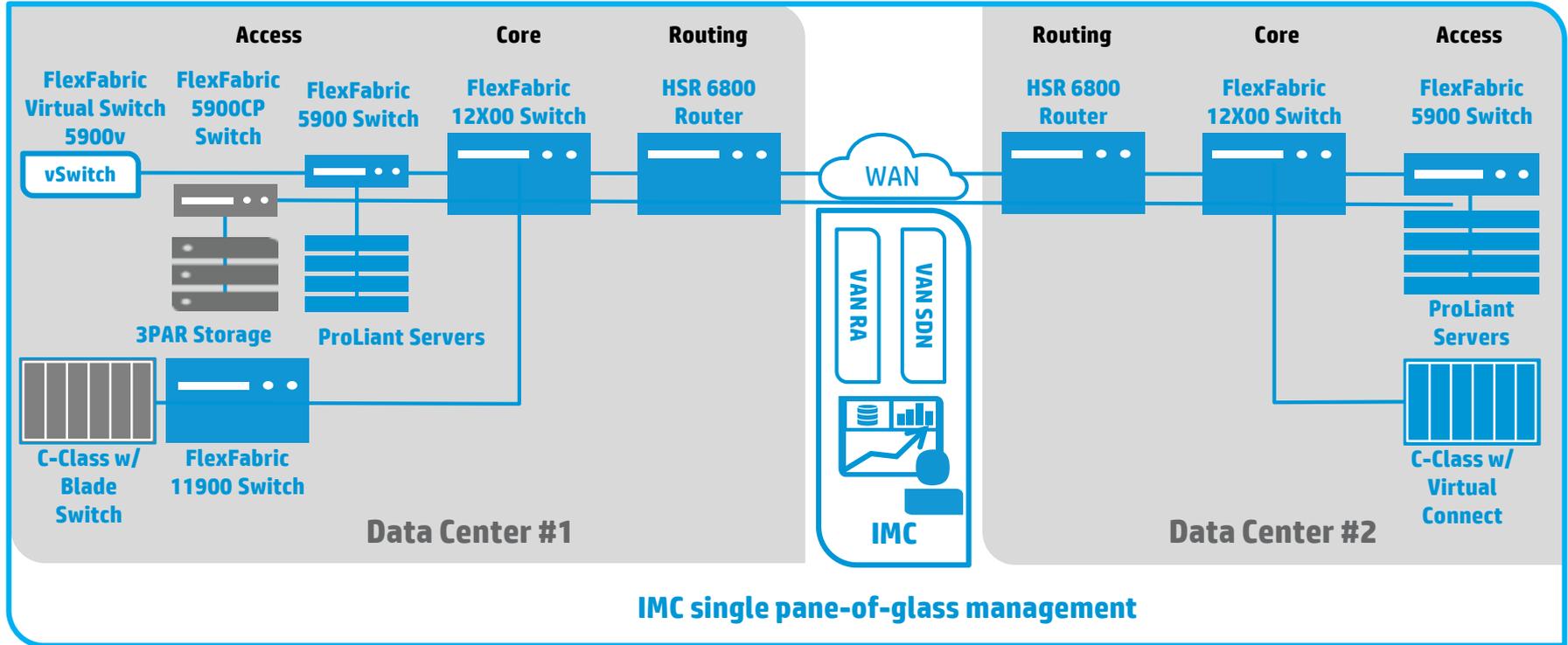
HP FlexFabric 5900CP advantages

Simplify your network with converged storage and networking



- Lower CapEx and OpEx with simplified 2-tier networks
- Lower TCO with fully licensed switches and no hidden network OS upgrade costs
- Best converged solution with industry's 1st universal optics and 48 converged ports
- Simple management of LANs and FC SANs with IMC Fabric Manager
- Investment protection with SDN ready 5900CP to deploy SDN when you are ready
- Unified physical and virtual network with IMC and VEPA
- Business resilience with Comware 7 modularity, ISSU and IRF fabric

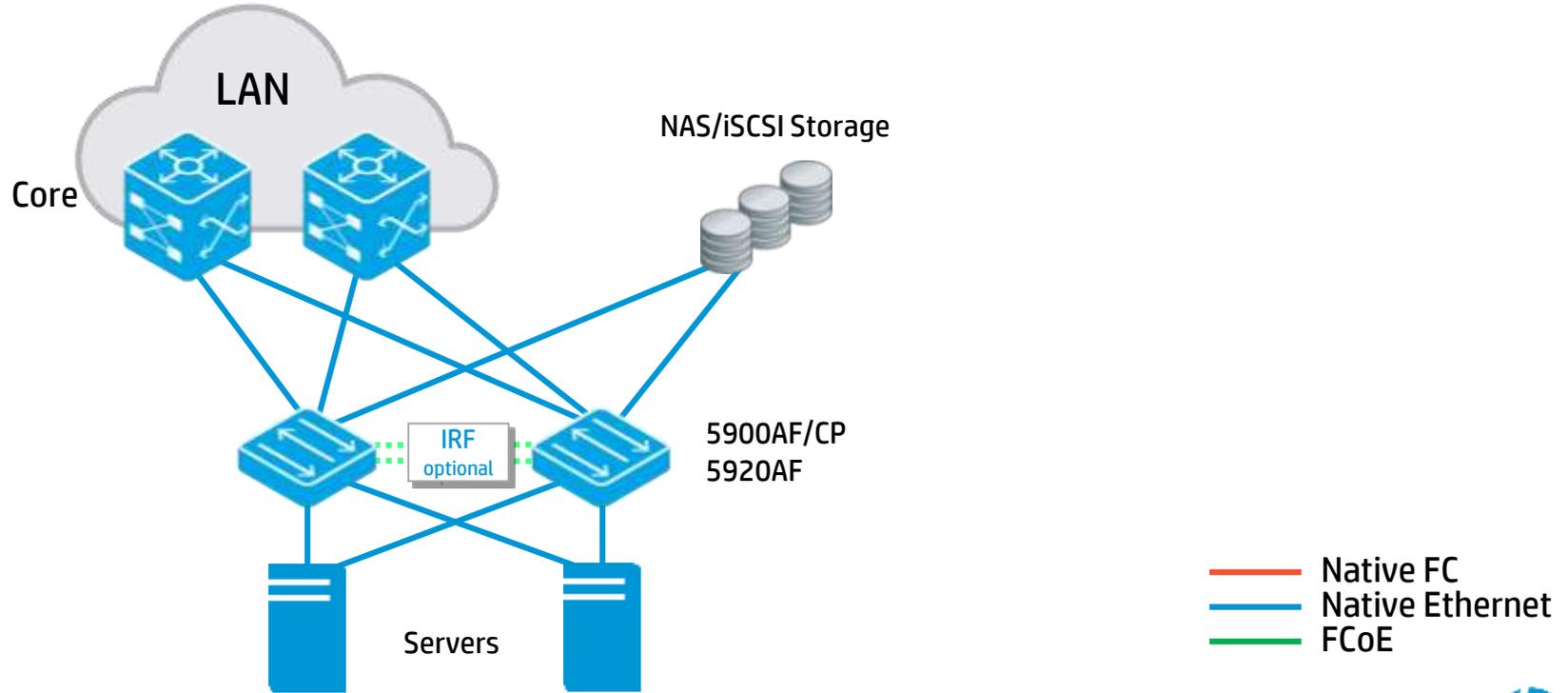
FlexFabric delivers simplicity, scale & automation



Базовые сценарии внедрения



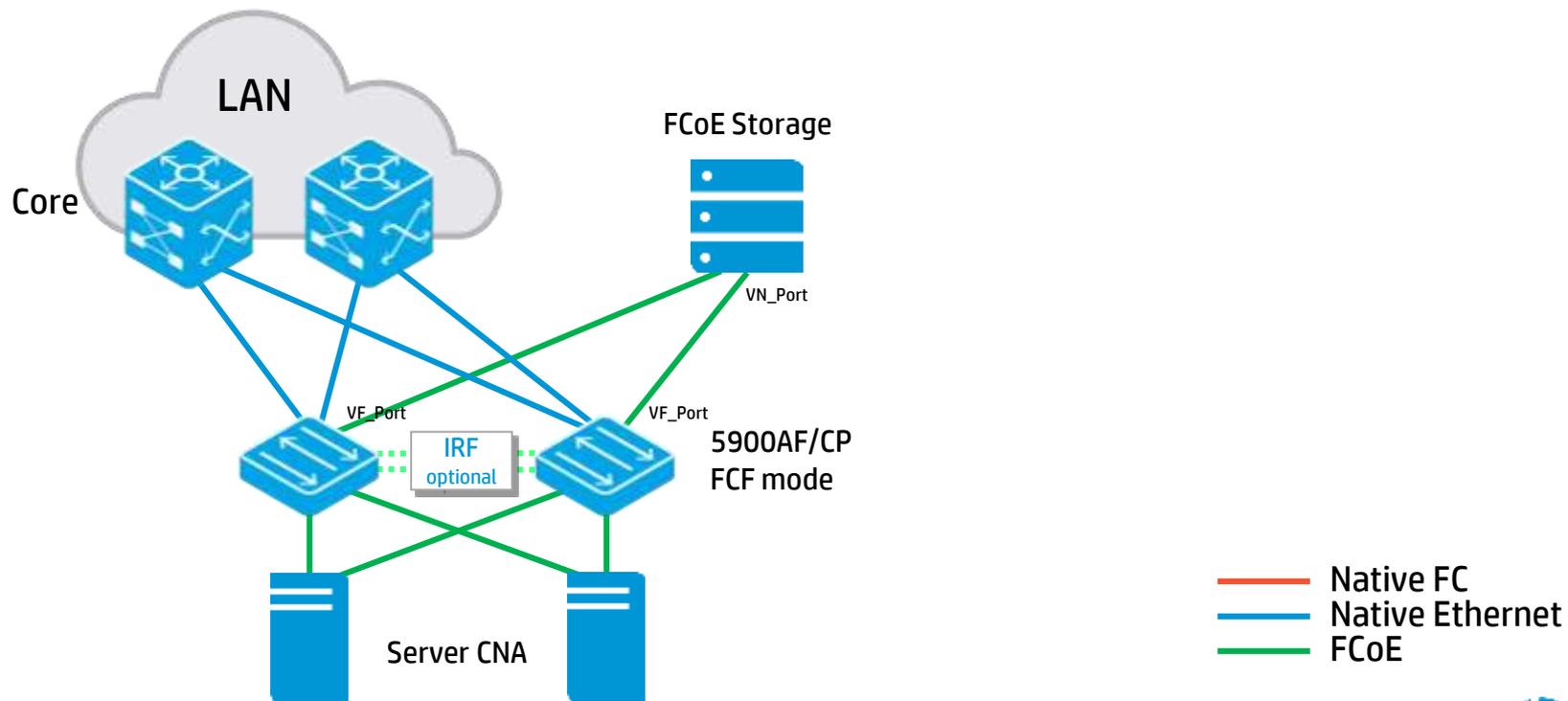
iSCSI scenario



Сценарий 1

(S1a-FCoE Storage, Rack)

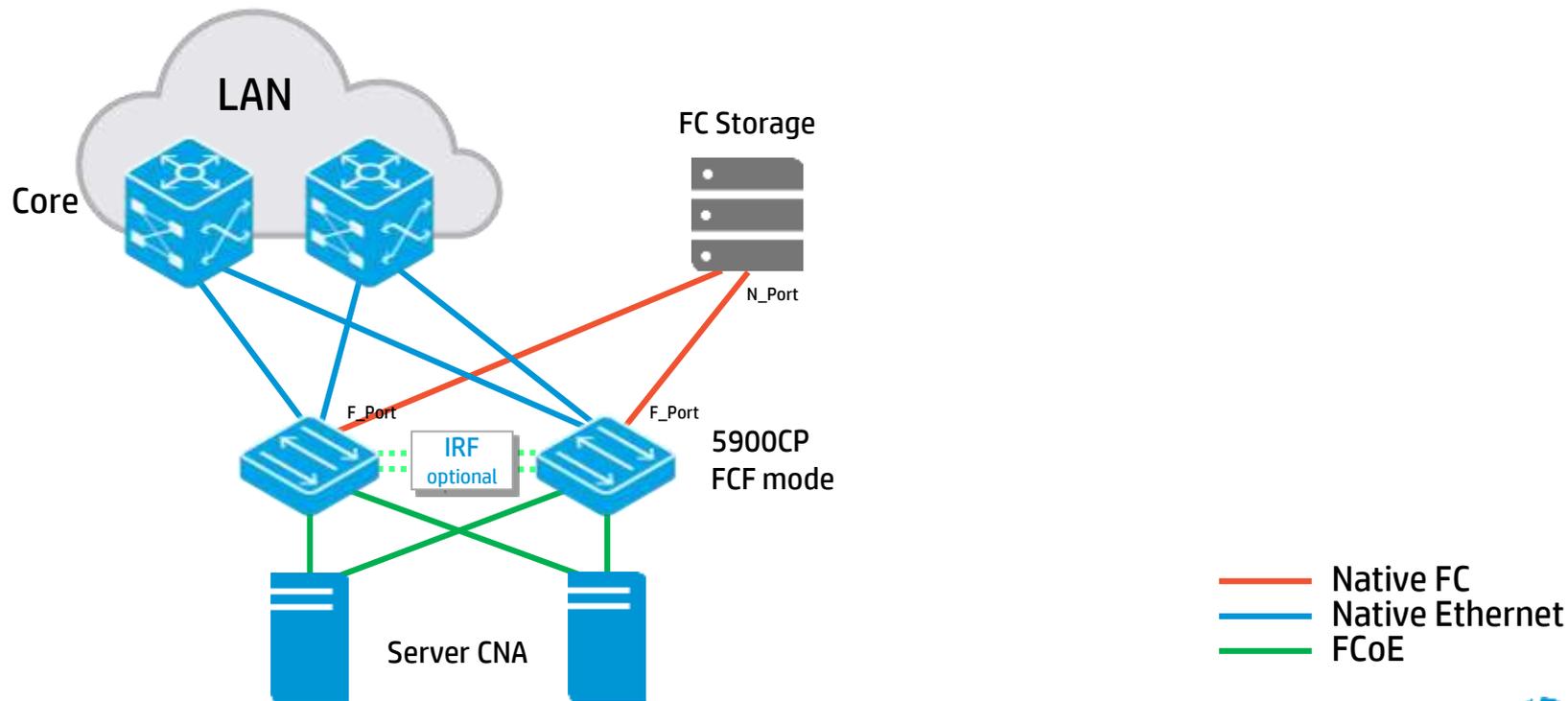
Flat Fabric SAN, FCF TOR (1 hop), Rack Server, FCoE Storage Use Case



Сценарий 2

(S1a-FC Storage, Rack)

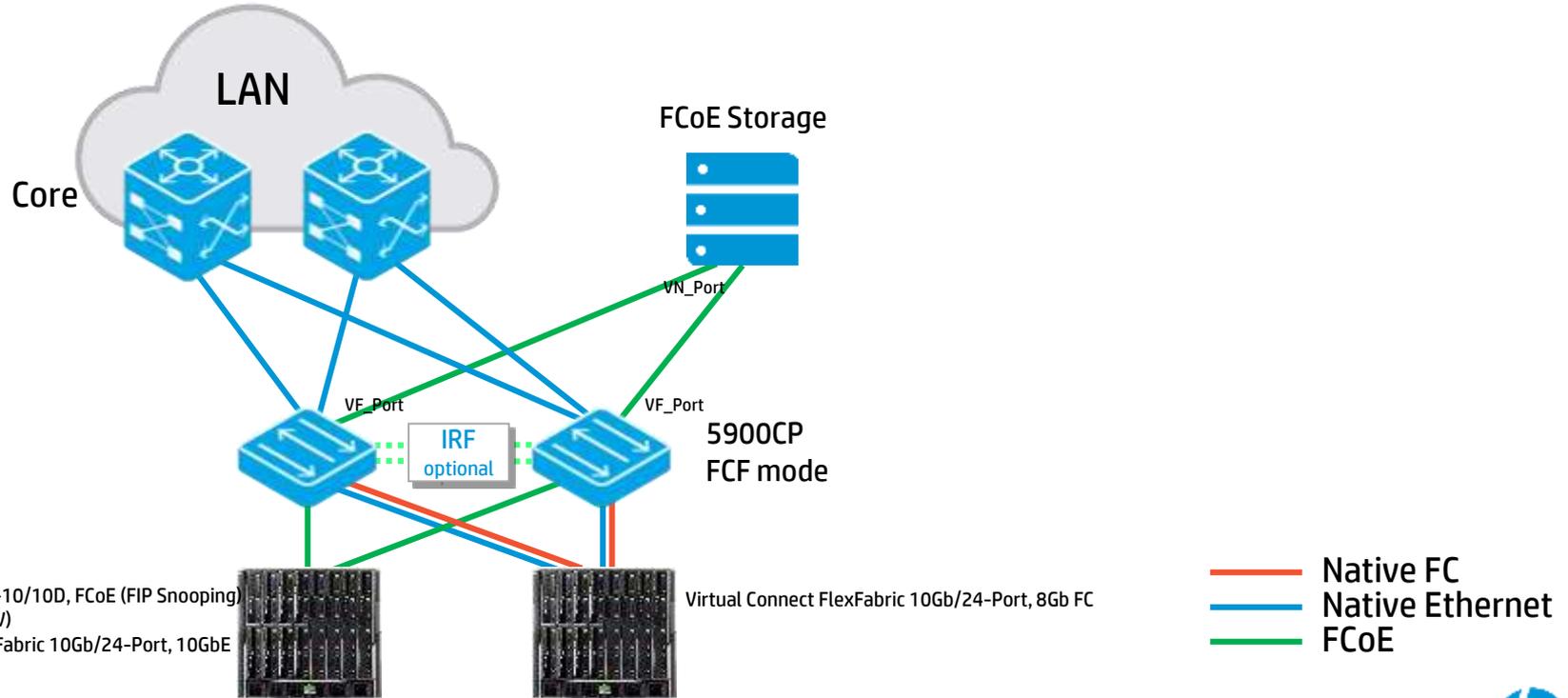
Flat Fabric SAN, FCF TOR (1 hop), Rack Server, FC Storage Use Case



Сценарий 3

(S1b-FCoE Storage, Dual-hop)

Flat Fabric SAN, FCF TOR (dual-hop), Blade Server Dual-hop, FCoE Storage Use Case



- Virtual Connect Flex-10/10D, FCoE (FIP Snooping)
- 6125-XLG, FCoE (NPV)
- Virtual Connect FlexFabric 10Gb/24-Port, 10GbE FCoE/Ethernet

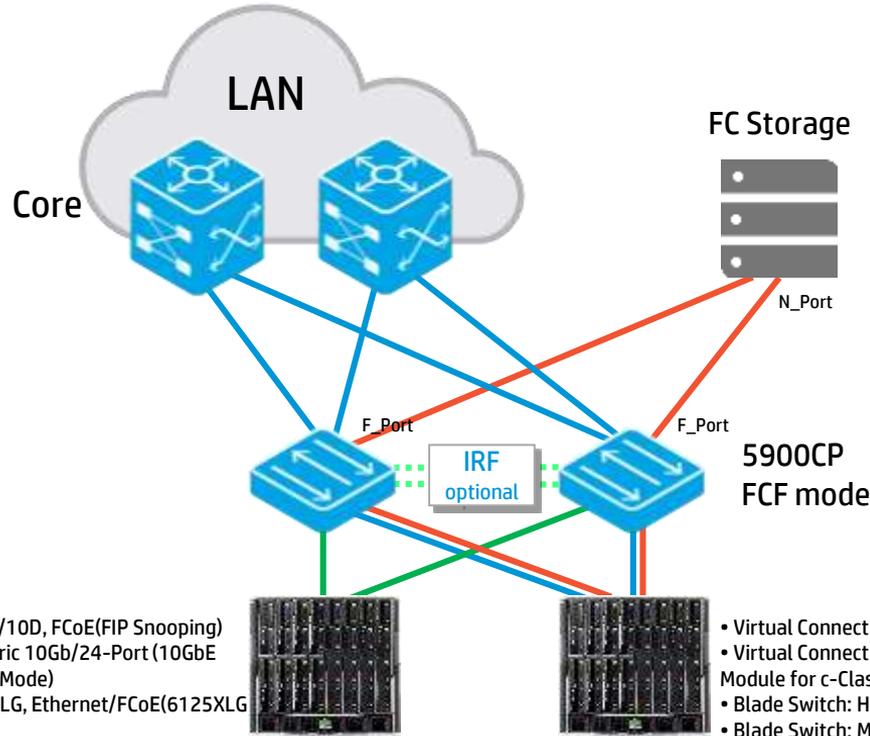
Second pair of LAGG links not represented.



Сценарий 4

(S1b-FC Storage, Dual-hop)

Flat Fabric SAN, FCF TOR (dual-hop), Blade Server Dual-hop, FC Storage Use Case



- Virtual Connect Flex-10/10D, FCoE(FIP Snooping)
- Virtual Connect FlexFabric 10Gb/24-Port (10GbE FCoE/VC in FIP Snooping Mode)
- Blade Switch: HP 6125XLG, Ethernet/FCoE(6125XLG in NPV mode)

- Virtual Connect FlexFabric 10Gb/24-Port, 8Gb FC
- Virtual Connect 8Gb 24-Port Fibre Channel Module for c-Class BladeSystem (Brocade)
- Blade Switch: HP 8/24c SAN Switch (Brocade)
- Blade Switch: MDS 8Gb 24-port Switch (Cisco)

- Native FC
- Native Ethernet
- FCoE

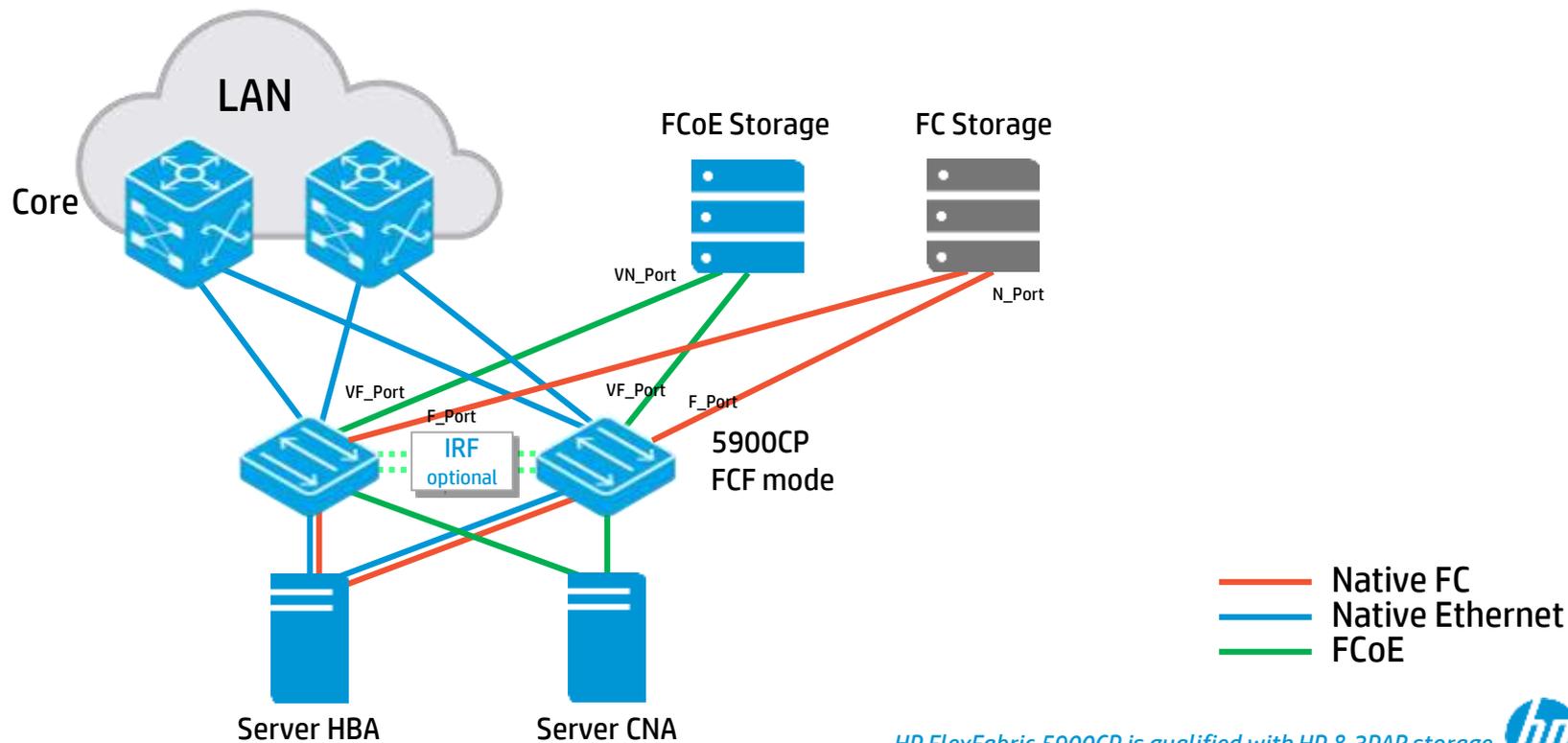
Second pair of LAGG links not represented.



Сценарий 5

(S1c-FC/FCoE Storage, Rack)

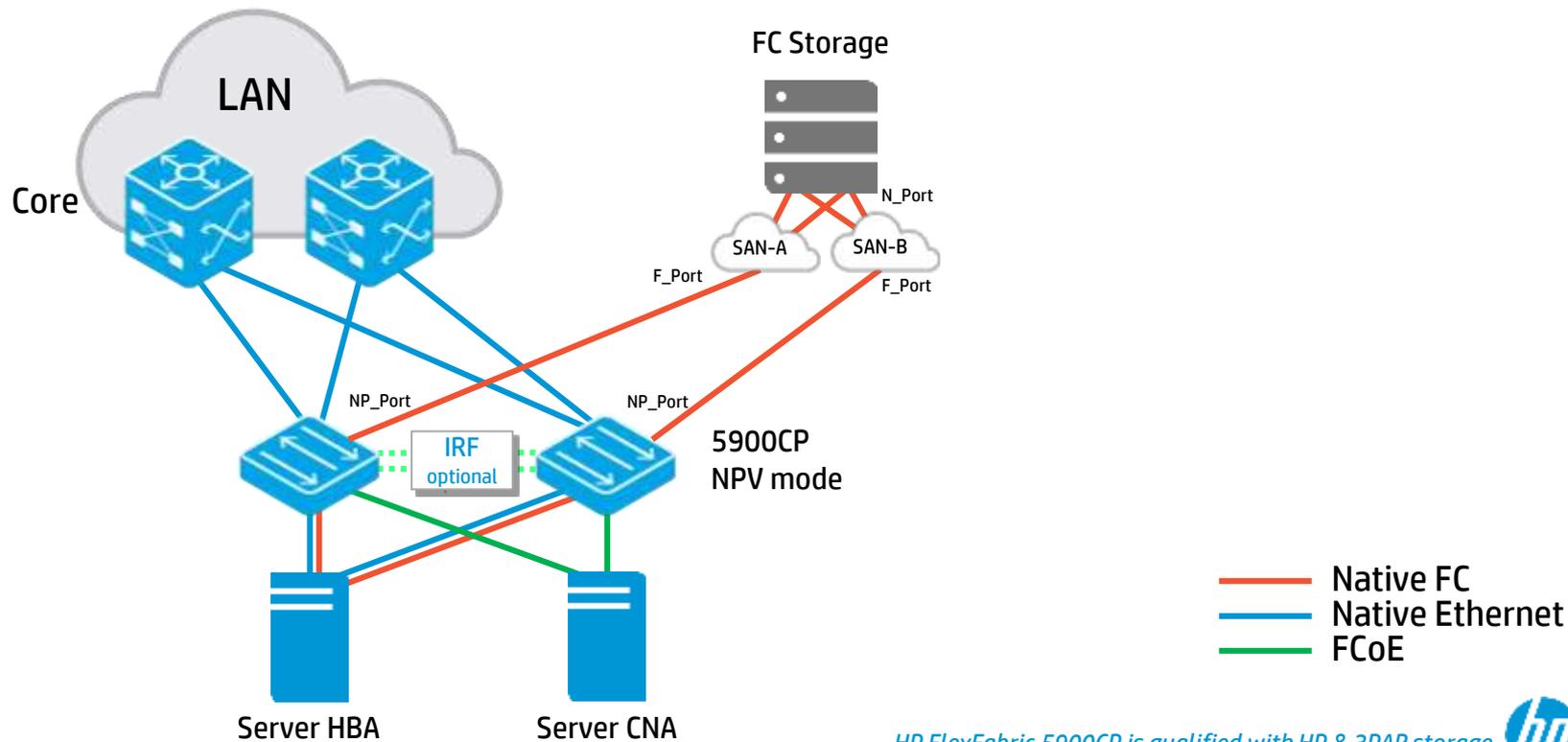
Flat Fabric SAN, FCF TOR (1 hop), Rack Server, FCoE/FC Storage Use Case



Сценарий 6

(S2a-NPV FC, Rack)

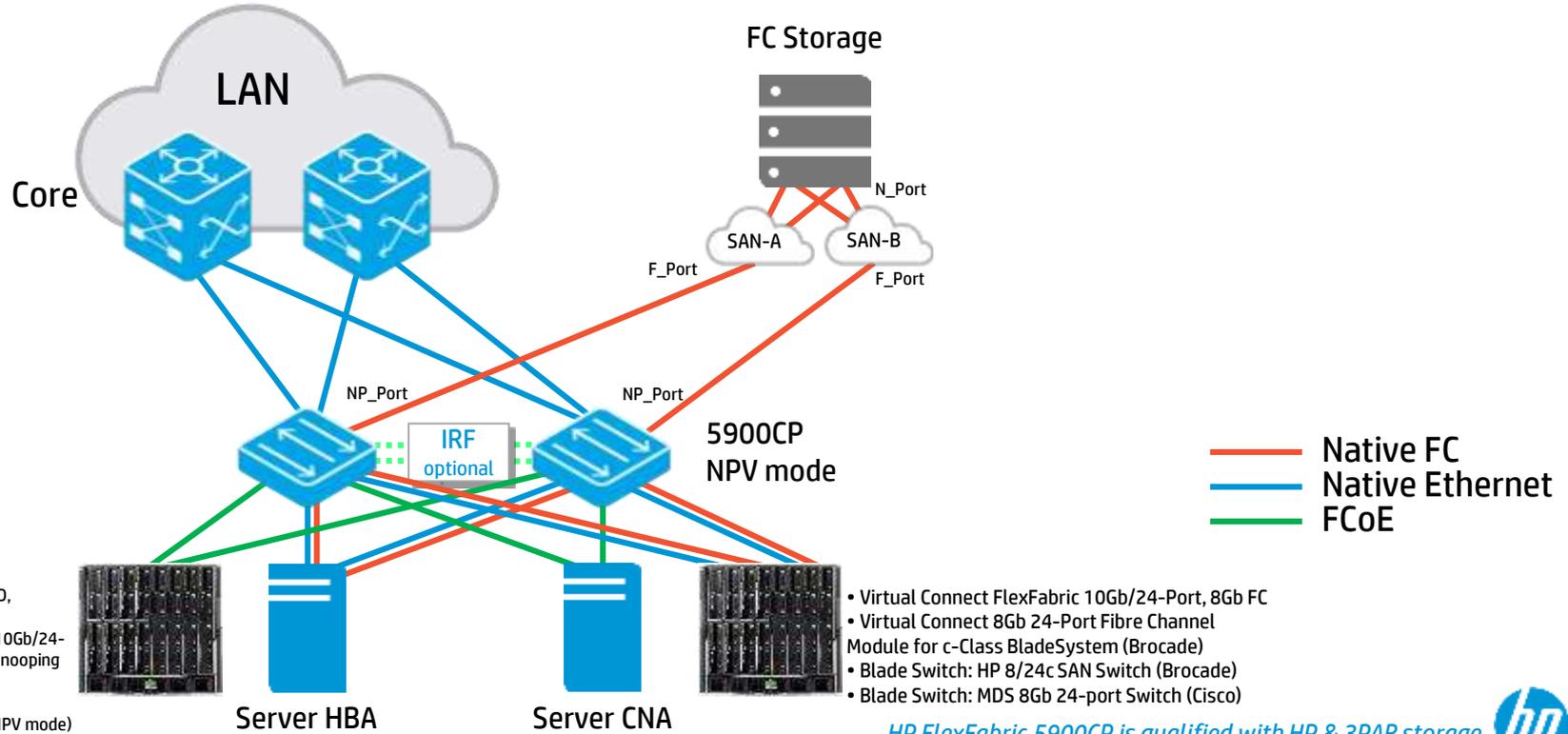
Legacy SAN, NPV TOR Rack Server, NPV-FC Storage Use Case



Сценарий 7

(S2b-NPV FC, Rack/Blade, Dual-hop)

Legacy SAN, NPV TOR Rack/Blade Dual-hop, NPV-FC Storage Use Case



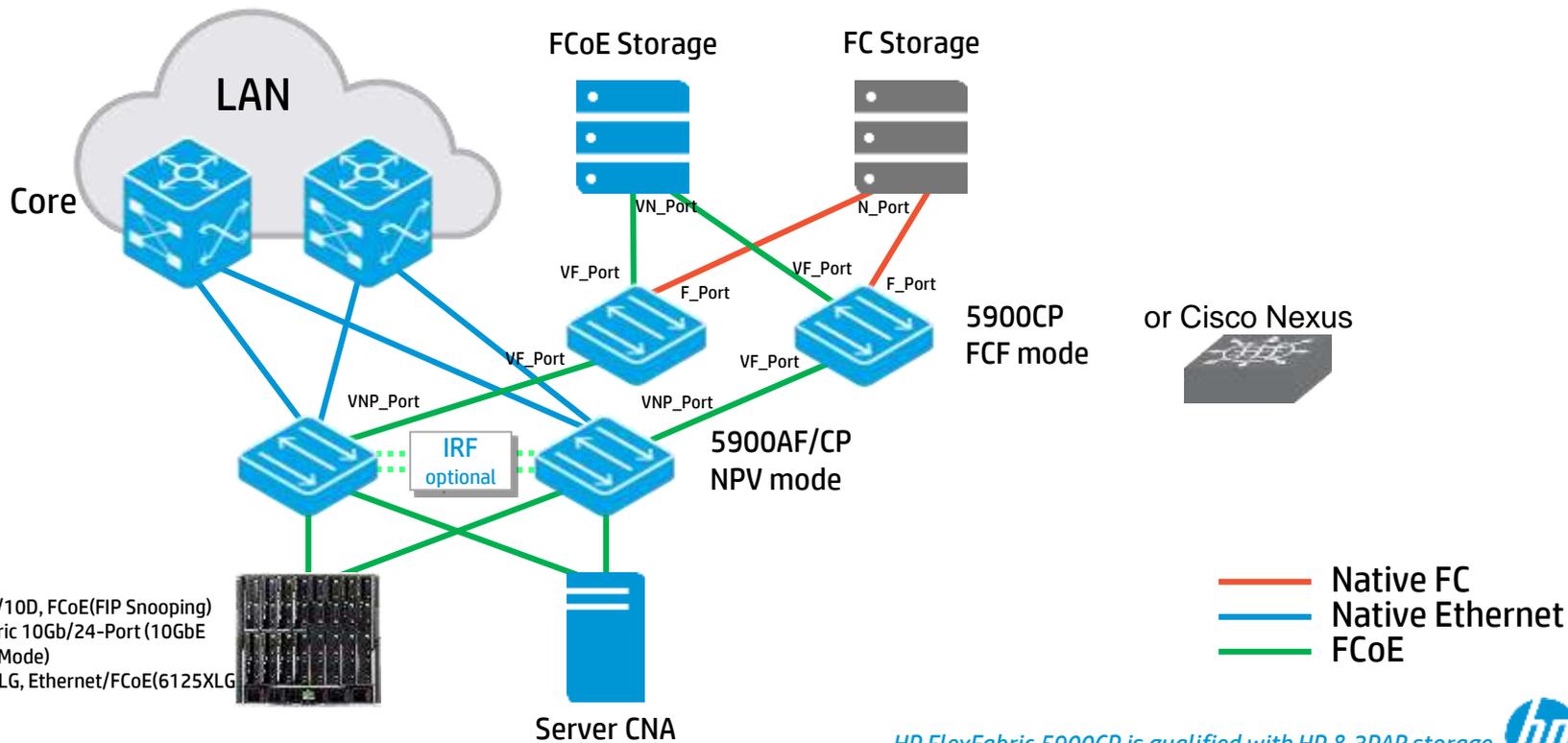
Расширенные сценарии внедрения



Сценарий 8

(S2c-NPV FC, Rack/Blade, Dual-hop)

FlexFabric 5900AF, FCoE/FC TOR, Rack/Blade Dual-hop, FCoE/FC Storage Use Case



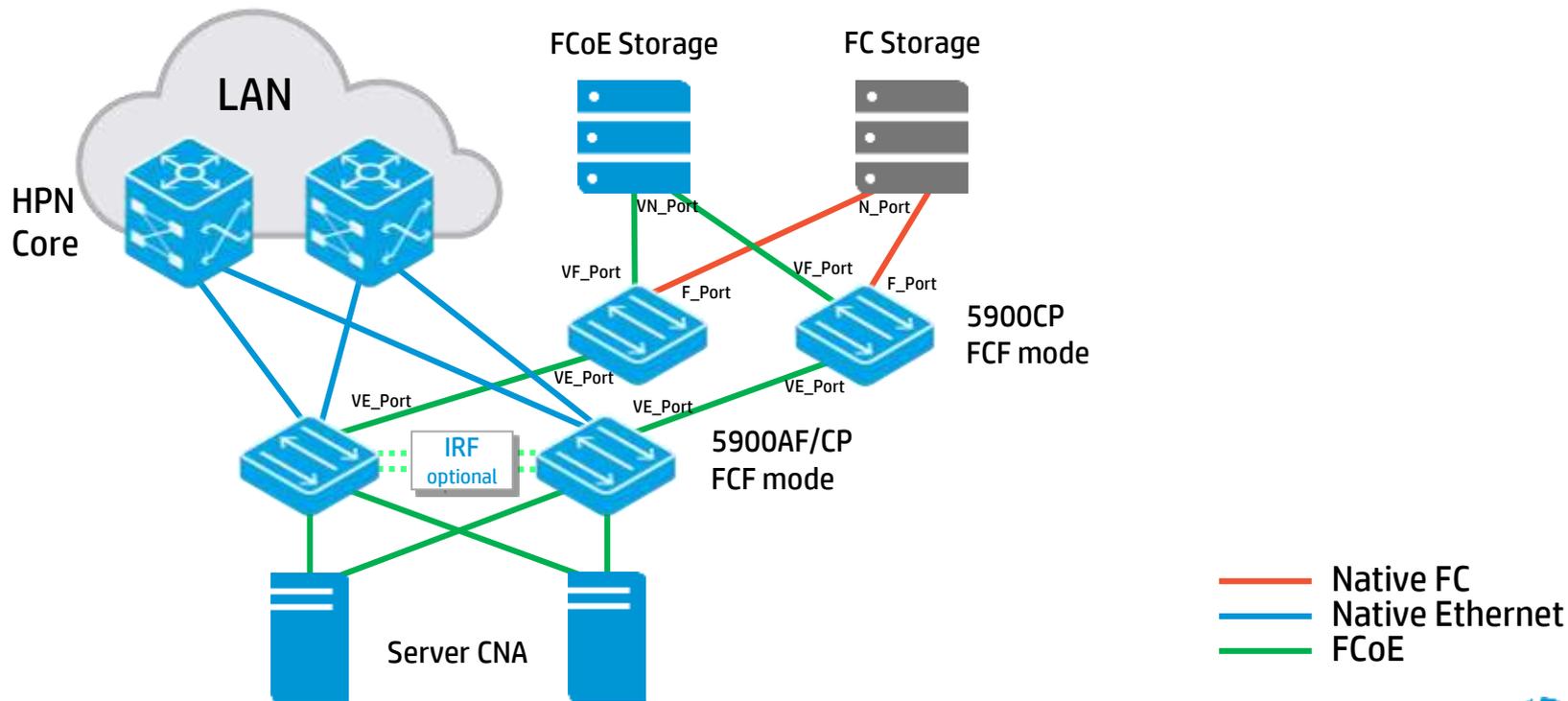
- Virtual Connect Flex-10/10D, FCoE(FIP Snooping)
- Virtual Connect FlexFabric 10Gb/24-Port (10GbE FCoE/VC in FIP Snooping Mode)
- Blade Switch: HP 6125XLG, Ethernet/FCoE(6125XLG in NPV mode)



Сценарий 9

(S3a-Multi-hop, Rack)

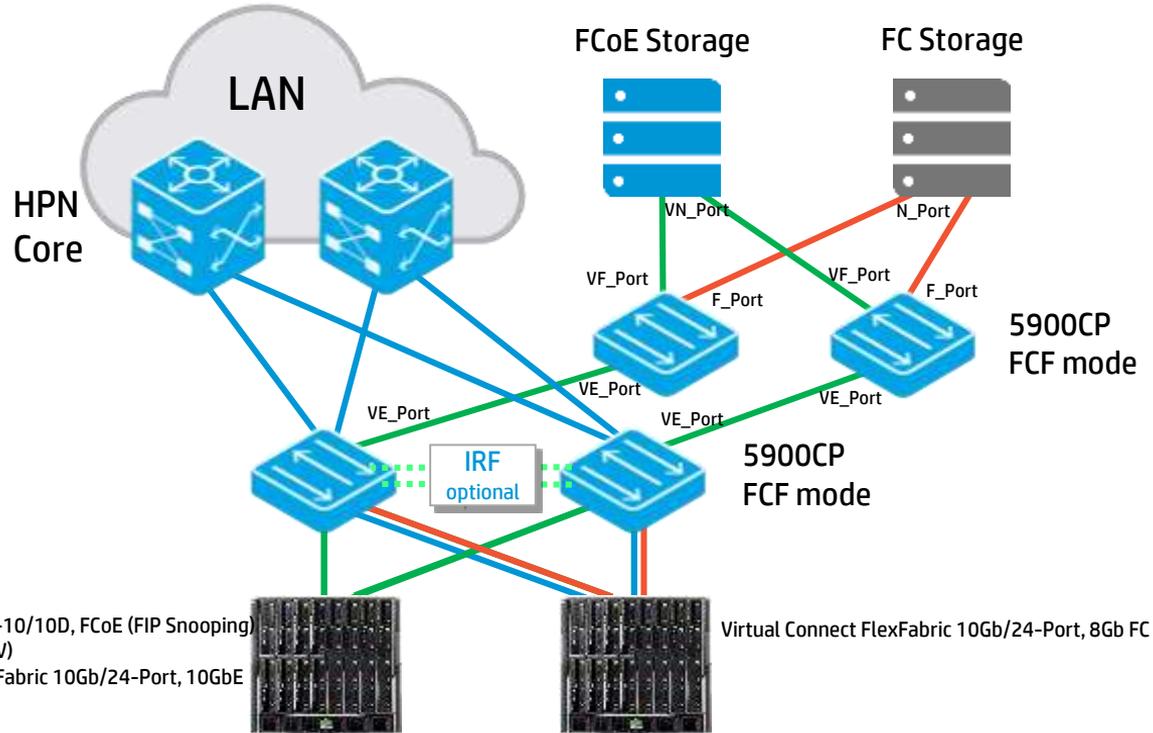
Mesh SAN, FCF TOR, Rack Server Multi-hop, FCoE/FC Storage Use Case



Сценарий 10

(S3b-Multi-hop, Blade)

Mesh SAN, FCF TOR, Blade Server Multi-hop, FCoE/FC Storage Use Case



- Virtual Connect Flex-10/10D, FCoE (FIP Snooping)
- 6125-XLG, FCoE (NPV)
- Virtual Connect FlexFabric 10Gb/24-Port, 10GbE FCoE/Ethernet

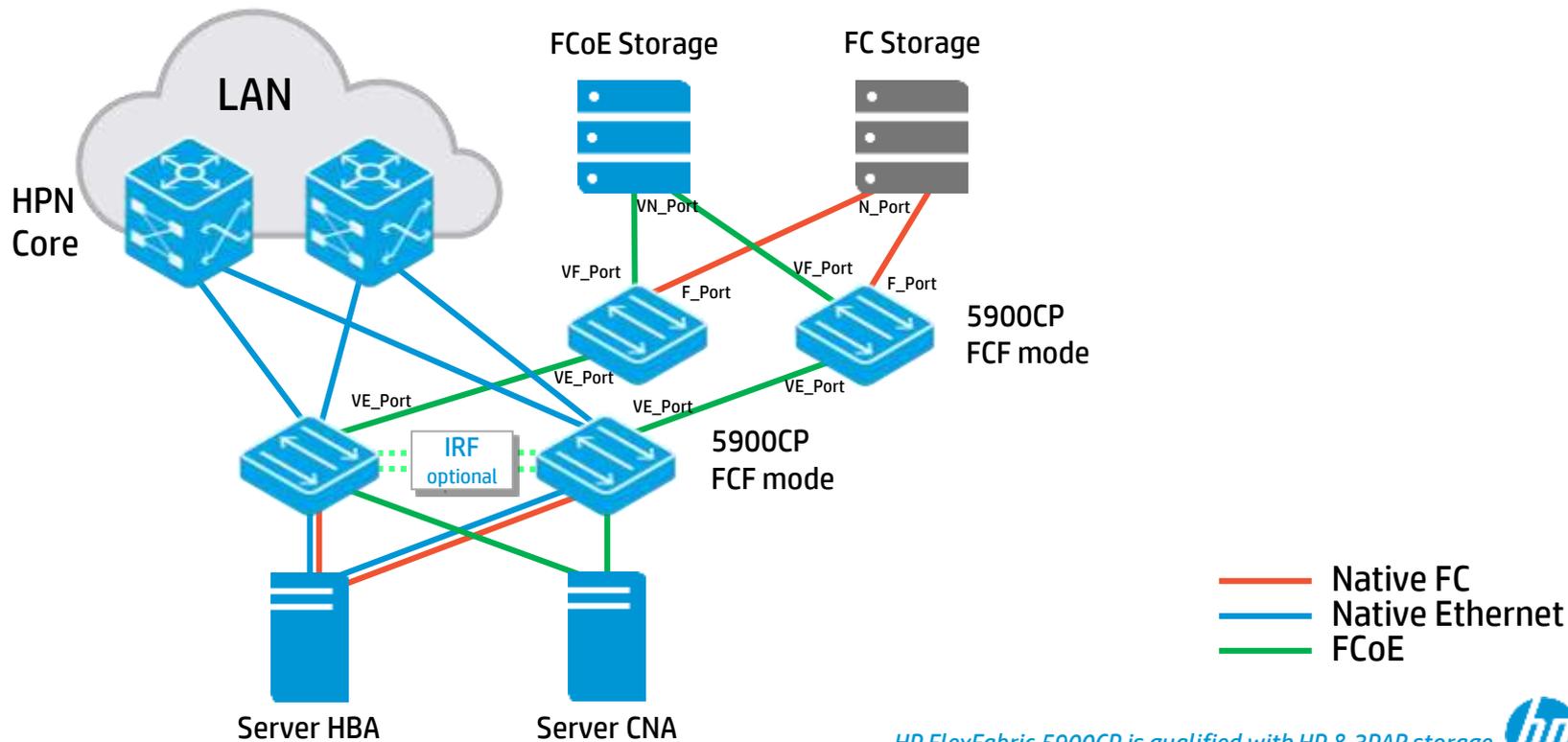
Virtual Connect FlexFabric 10Gb/24-Port, 8Gb FC



Сценарий 11

(S3c-Multi-hop, Rack, CNA/HBA)

Mesh SAN, FCoE TOR, Rack Server Multi-hop, FCoE/FC Storage Use Case



Преимущества использования IRF



IRF and FCoE use cases

Technologies

- IRF is key HPN technology for HA, HW redundancy, N:1 Virtualization.
- FCoE is a technology to converge the LAN and FC SAN traffic in the DC.
- HP FlexFabric 5900CP solution combines the 2 technologies to provide unique customer benefits.

Significance

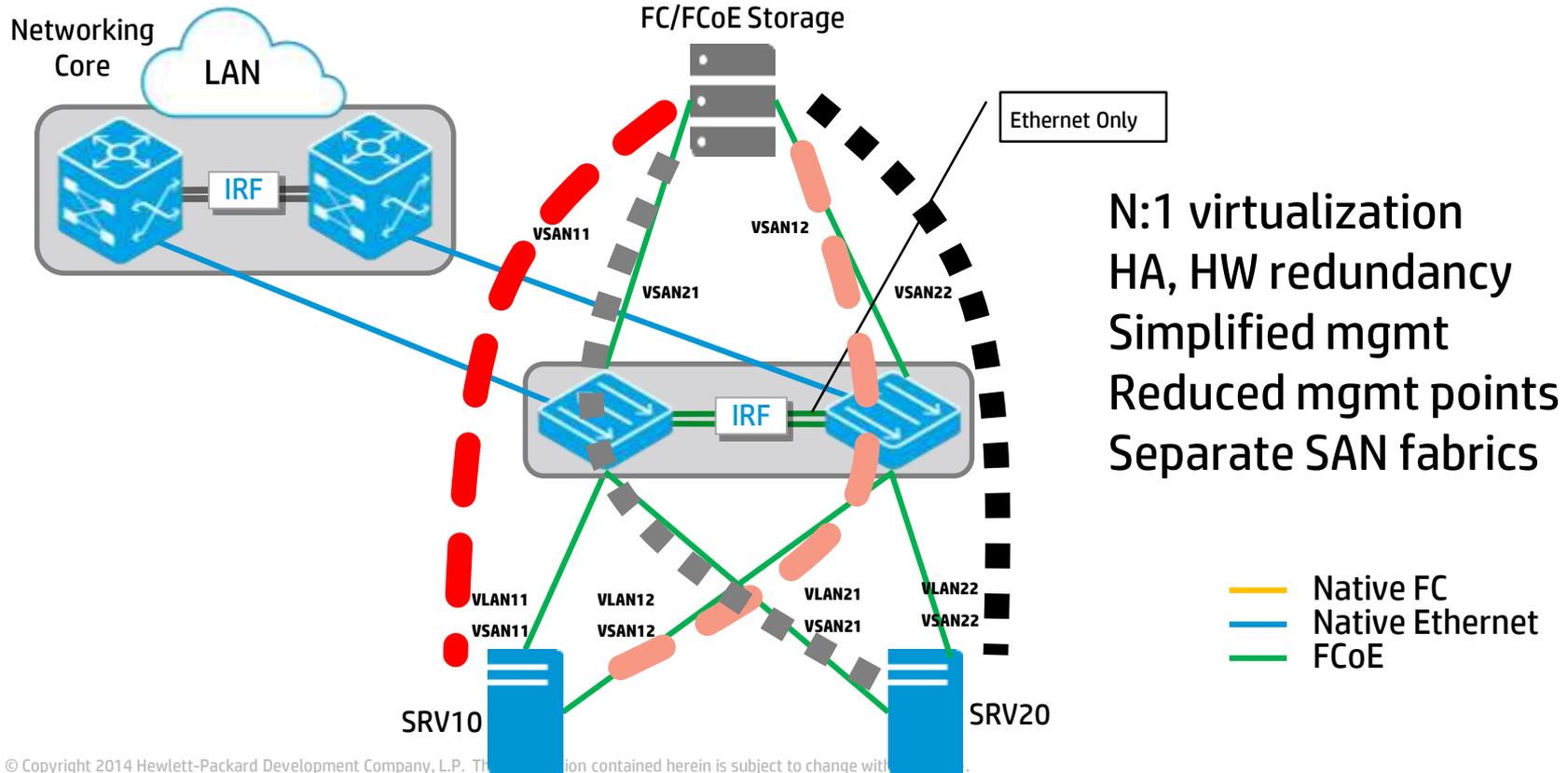
- FCoE and IRF are initially designed for different proposes.
- FC SAN fabric is required to have 2 separate physical/logical paths for storage traffic.
- The use cases are to define how to leverage all the IRF benefits in the FC/FCoE environment.

Positioning

- The use of IRF in FC/FCoE environment is not mandatory.
- The use cases apply to all HPN IRF based FCoE implementation(TOR/Core).
- The IRF/FCoE use cases apply to both single hop and multi hop FCoE environment.

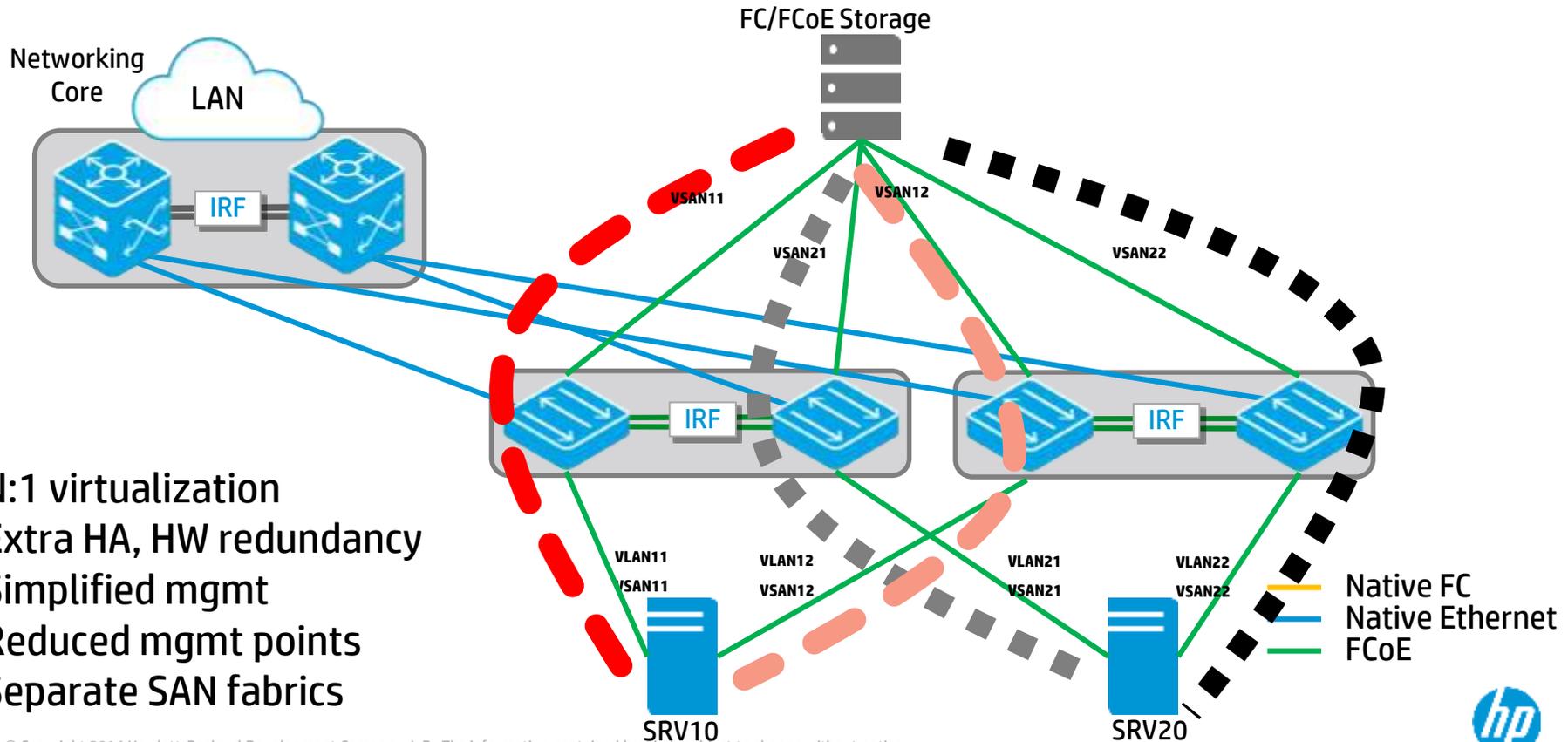


IRF & FCoE вариант 1 один IRF стек



N:1 virtualization
HA, HW redundancy
Simplified mgmt
Reduced mgmt points
Separate SAN fabrics

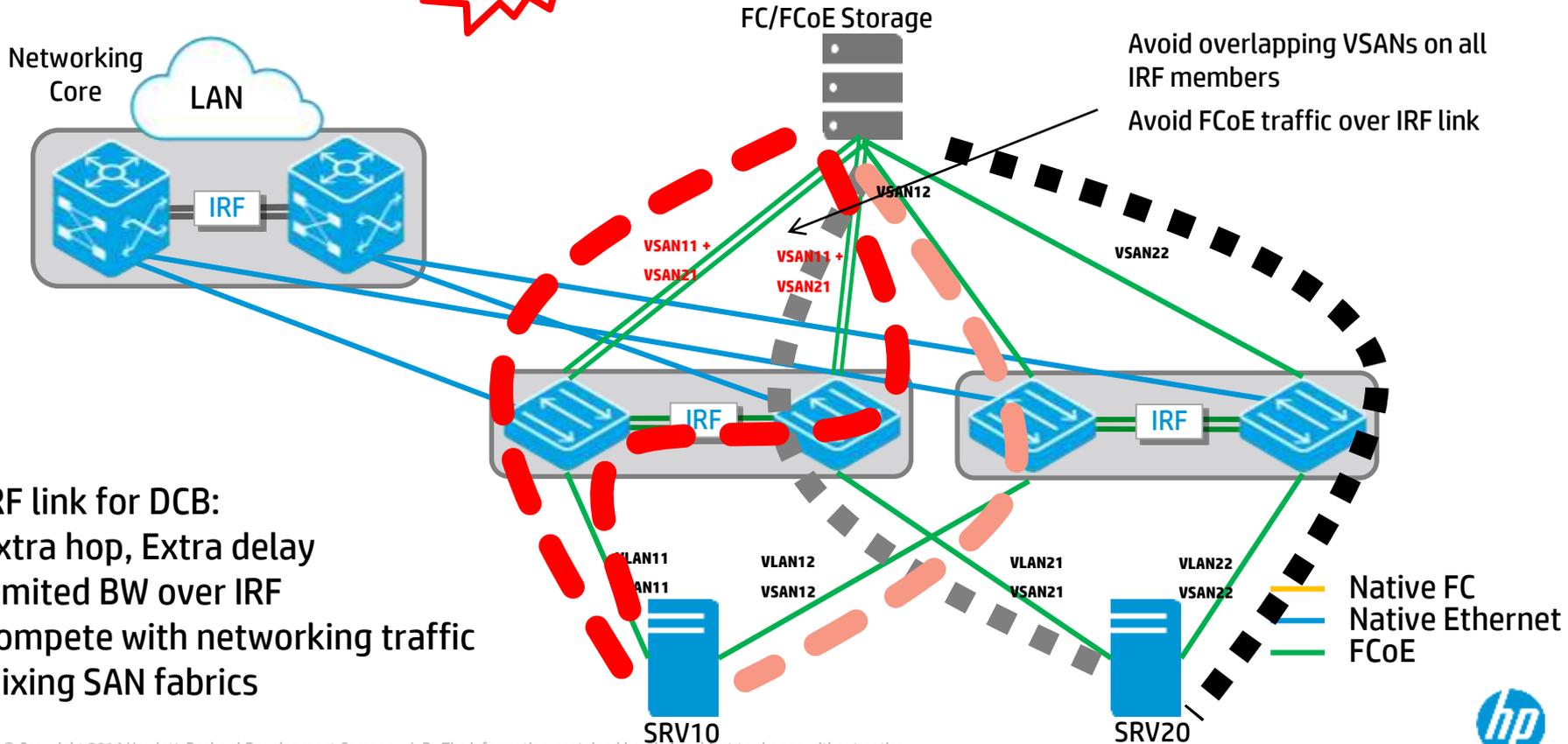
IRF & FCoE вариант 2 два IRF стека



- N:1 virtualization
- Extra HA, HW redundancy
- Simplified mgmt
- Reduced mgmt points
- Separate SAN fabrics



IRF & FCoE Must avoid overlapping VSANs on IRF



IRF link for DCB:
Extra hop, Extra delay
Limited BW over IRF
Compete with networking traffic
Mixing SAN fabrics



IRF & FCoE Must avoid long distance



Thank you

