

U2000 Evolution to NCE

Date: 23/09/2019



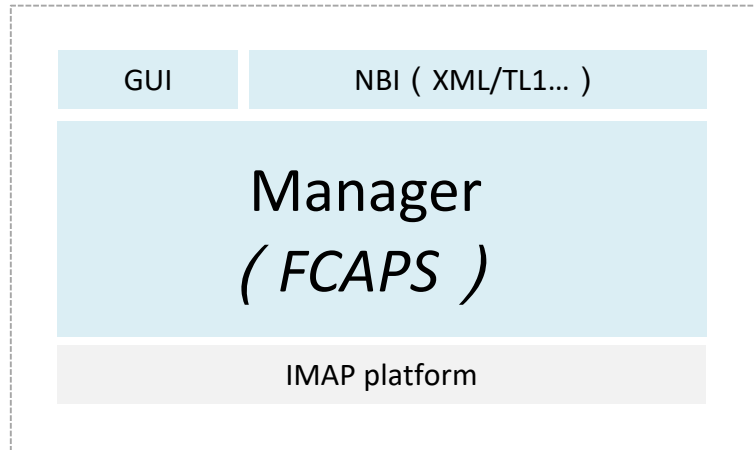
Security Level:



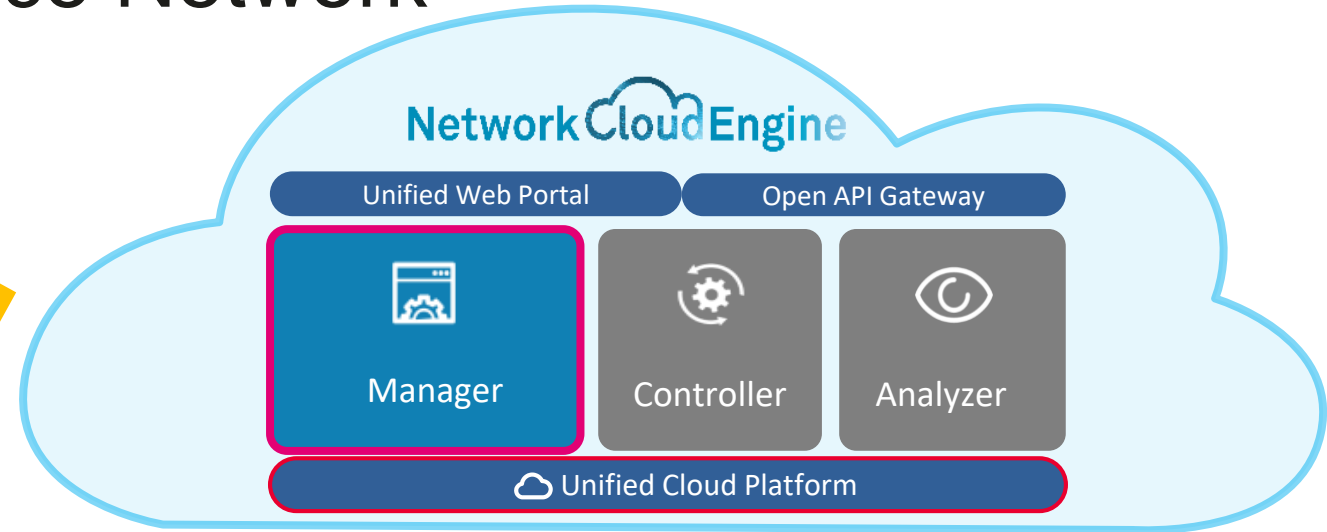
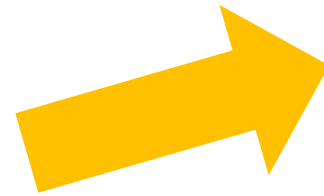
Contents

1. What & When: Comparison of U2000 and NCE
2. How: Smooth Migration from U2000 to NCE

What: NCE as a Sustainable Solution & Towards Automation & Intelligence Network



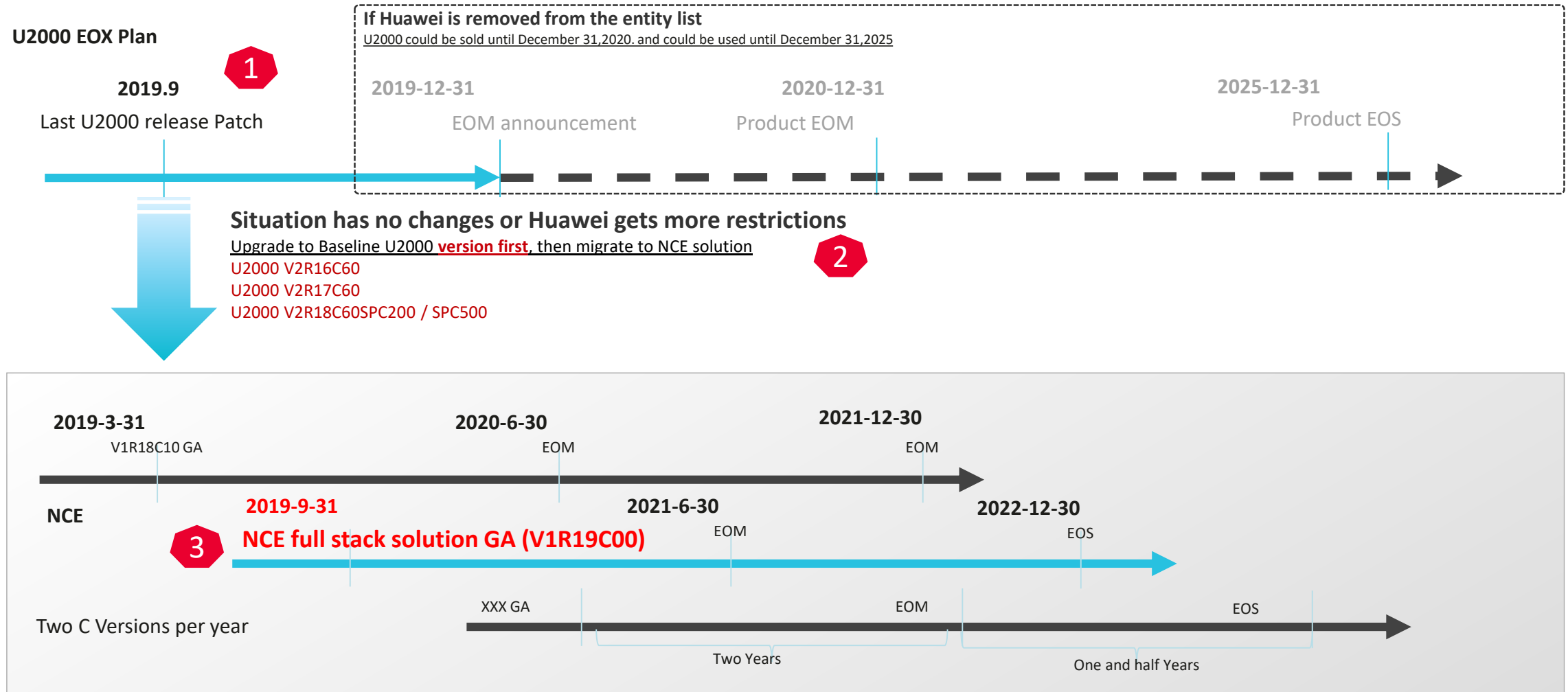
Fault, Configuration, Accounting, Performance and Security



NCE - Network Cloud Engine as a Sustainable Solution

- **Unified platform under Hardware: Taishan Server + Virtualization layer : FusionSphere or Fusion Computer (optional) + OS: Euler + DB: GaussDB**
- **Manager: Traditional management function. Complete replacement for U2000.**
- **Controller/ Analyzer : Enable network automation and intelligence. Unleashing Network Potential, Reducing O&M Complexity, and Implementing User-Centered Operations**

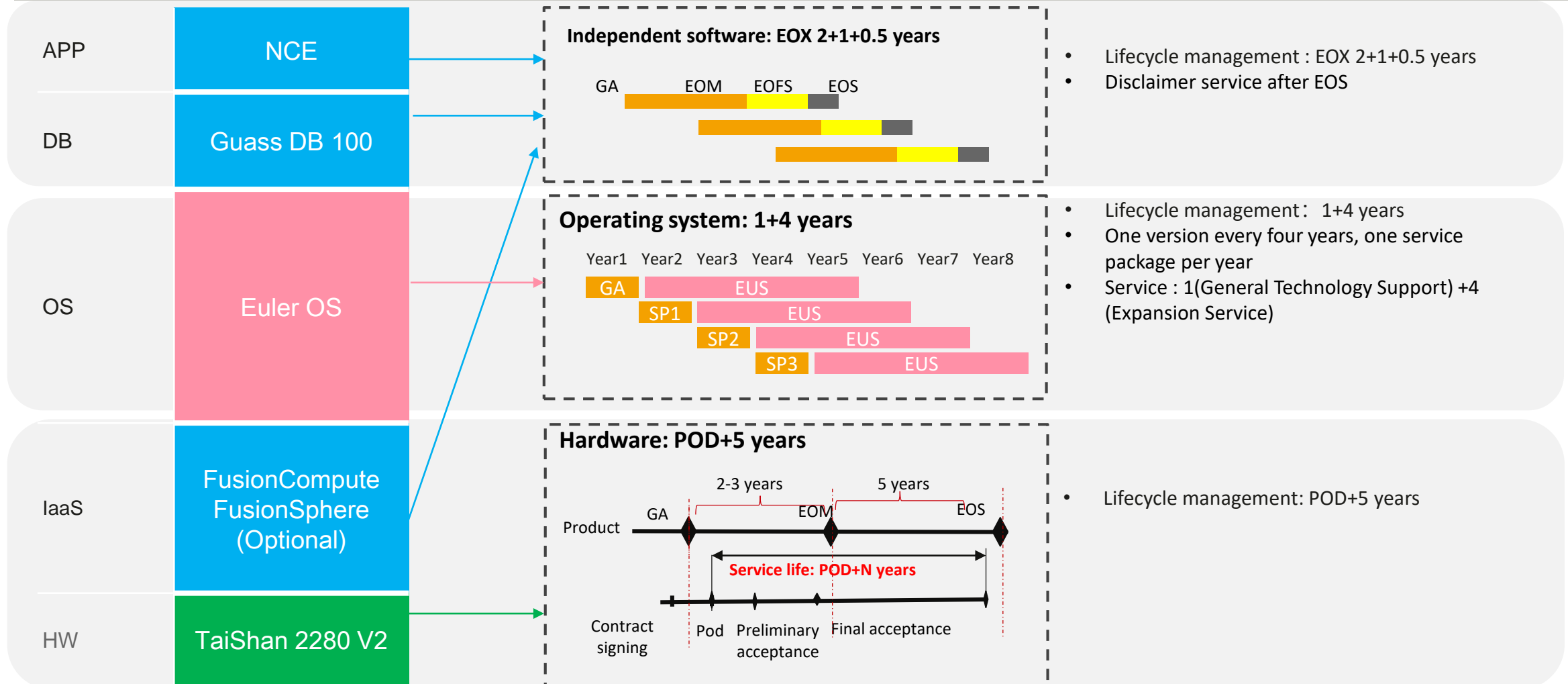
When: Huawei U2000 to NCE Full Stack Version Plan



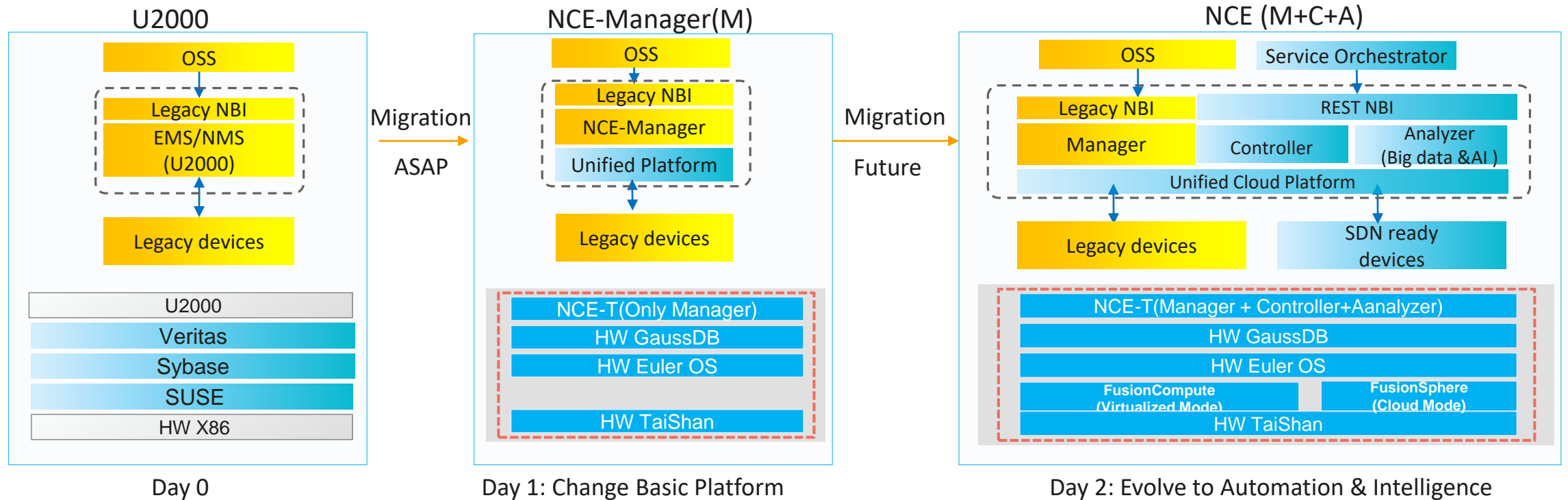
- NCE products have been deployed in 200+ projects, including Columbia AM, Philippines Globe, China Mobile, China Unicom, and so on.

Product Lifecycle of Huawei NCE Solution

The management and control application software is independent of hardware and system software.



NCE-T Huawei Full Stack Solution Deployment



Equivalent NEs <=15K



- Only for NCE Manager part deployment on a physical server without virtualization layer.
- The elastic expansion is not supported in bare metal deployment
- Migration operation is needed if change from U2000 to NCE-Manager

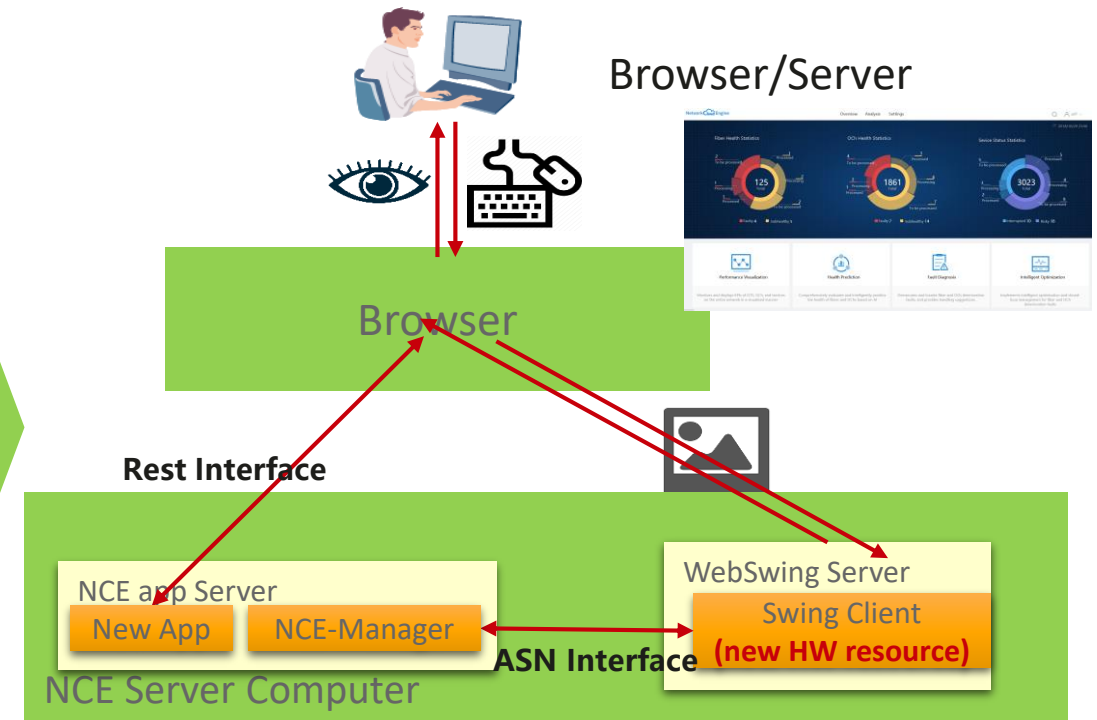
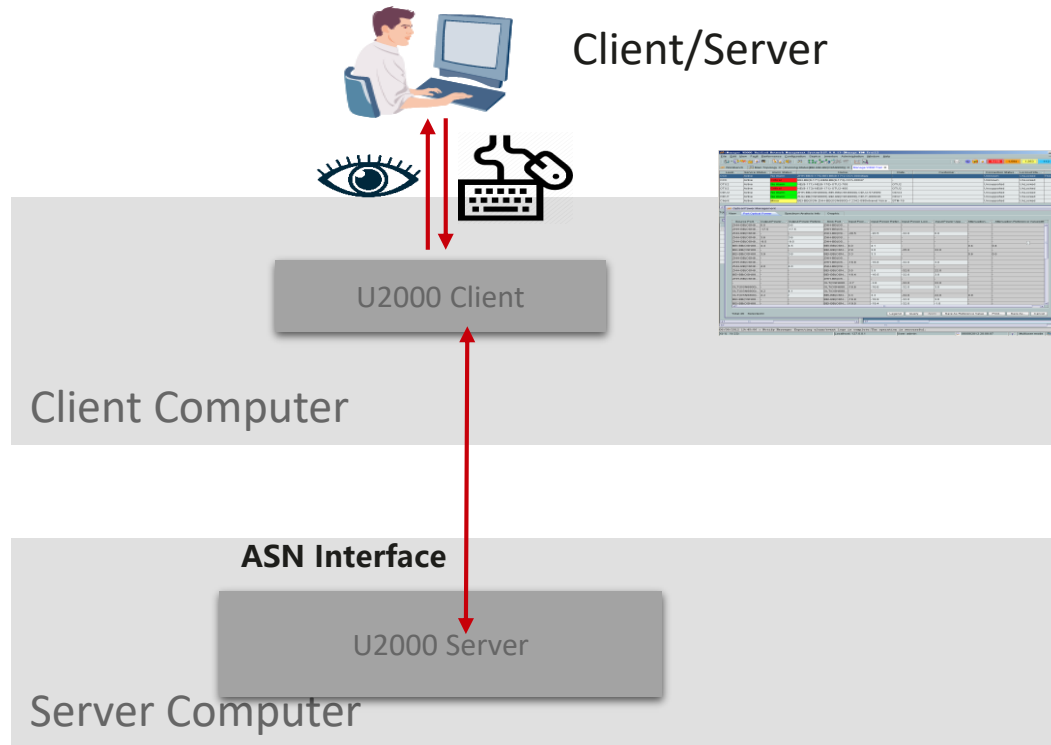
N Taishan Cluster per site for virtualized & distributed deployment mode or Private Cloud Mode



Equivalent NEs 6K, 15K, 30K, 50K ...

- Provide local protection capabilities in cluster deployment scenario
- Elastic expansion is supported according to different extension scenarios

Web-based Client in NCE Full Stack Solution



	U2000(Client /Server)	NCE (Browser/Server)
Client	local download and installation , client runs on the local personal desktop	Without client installation, client running on the server No dedicated server for citrix Open source browsers are supported
Operation	Local & Single Function	On the server & User Centric
Files operation	Local	All on the server

Basic HW – Taishan 200 -delivering high efficiency computing to the network OSS

Based on the Kunpeng 920 processor, the highest performance the industry

2280 Equilibrium

Balanced network, storage, and computing capabilities



17 years of engineering process accumulation

Operating over 40° C

Passive backplane

& triple hard disk shockproof

Heat dissipation
liquid cooling

High-speed
interconnection

Reliable
Design

Quality
control

56GB board-level high-speed
interconnection

The failure rate is lower than
15% in the industry.



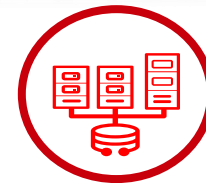
Hadoop
Big data

Cluster performance **↑30%**
Converged deployment



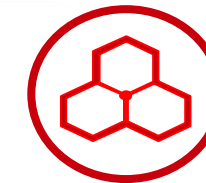
SDS
Distributed storage

Storage performance **↑30%**
Compression/decompression time
reduce **66%**.



High-performance
computing

HPC performance **↑20%**
Liquid cooling , cooling PUE <= **1.15**

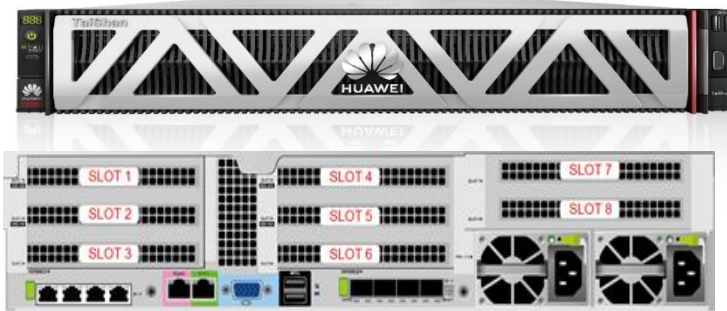


Database
Database

TPC-H query performance **↑53%**

Basic HW – TaiShan 200 Balanced Server Technical Specifications and Reference

Balanced Computing, Storage and Network Capability with Flexible Scalability



Main specifications

- 2U
- 2 Kunpeng 920 processors
- Up to 32 DDR4 DIMMs
- 16 x 3.5" SAS/SATA HDDs or 27 x 2.5" SAS/SATA HDDs or 16 x 3.5" NVMe SSDs
- Up to 8 PCIe 4.0 x8
- 4 x GE, 4 x 10GE, or 4 x 25GE ports



Public Cloud PaaS & SaaS



Cloud games



Distributed cache DCS



Cloud phone



UQuery



Cloud container



USearch

Internal IT



Mobile phone simulation



Chip simulation



Compile and build, automatic test

IaaS



BMS



VM



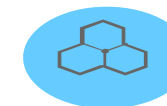
Cloud drive

Huawei Internal IT Application Practice :100,000+ Kunpeng device, running **stably for 3 years**

Cloud-based core network



Data service



VoLTE voice service



TaiShan server



Operating system

EulerOS

Virtualization software

FusionSphere ^{Enabled}

Distributed storage

FusionStorage

Database

GaussDB

China Mobile Zhejiang: **The world's first cloud-based core network voice phone based on the Kunpeng computing platform**

Basic SW - Euler OS is reliable, secure, serviceable, Linux distribution for cloud-native IT businesses.

Enterprise-class OS from the Linux community

Open
Euler

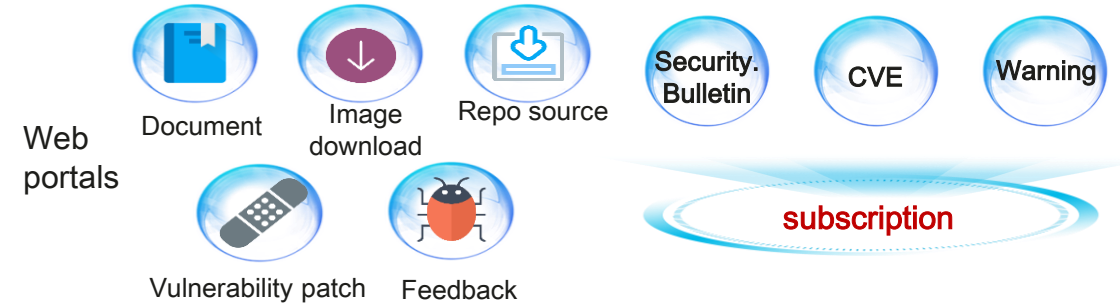


Euler Release 2.5:
Kernel: 3.10.0 - xx
Glibc: 2.17 - xx
GCC: 4.8.5 - xx



Comes from the stable open-source version openEuler built by Huawei

Security and patch management



- Users can learn about, download, update EulerOS and provide feedback on the website.
- After the user subscribes, when the security bulletin and vulnerability patch are released, the system will inform the user by the email.

Product certification, security and cooperation

- Computer Software Copyright
- Chinese system GB18030-2005
- Publication of Copyright Office Software Publications
- IPv6 Ready
- **Linux Foundation LSB5.0**
- **BSI PP (CC EAL4+)**
- **NIAP PP (CC EAL2+)**
- **NIST CAVP**
- **Nessus Security Vulnerability Scanning Tool**
- **NSFOCUS RSAS security vulnerability scanning tool**

Qualification & Patent

Security capability

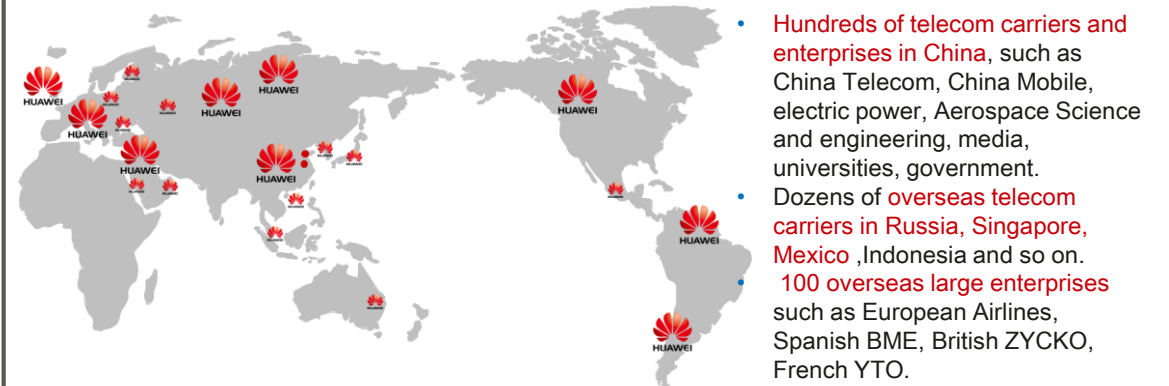
Cloud platform authentication

- Microsoft Azure cloud platform
- Amazon AWS cloud platform
- Docker Hub
- Ubuntu cloud platform

Industry cooperation

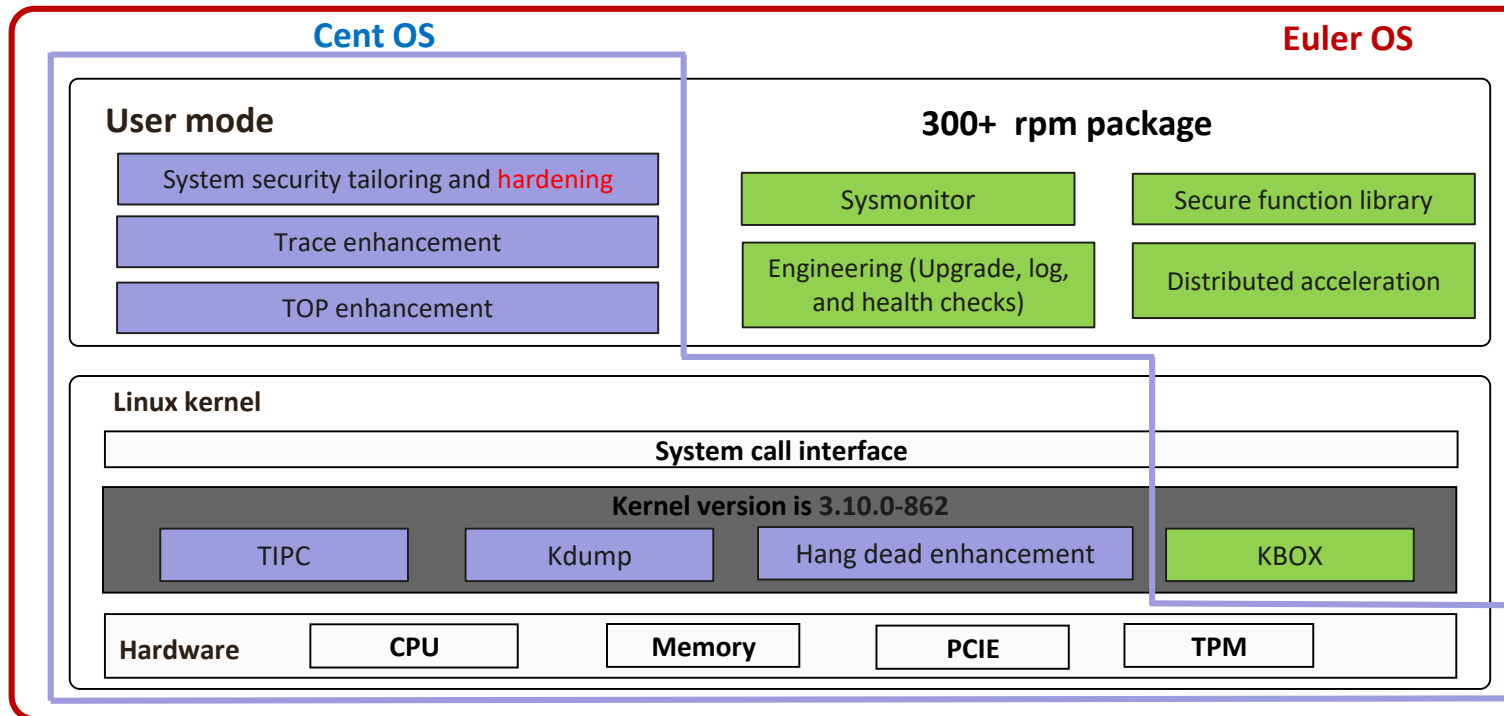
- **HiSilicon ARM chip SW and HW** collaboration
- OpenGroup UNIX03
- Mainstream SW and HW compatibility

Integrate into Huawei Cloud Platform (200K sets)



Basic SW - Euler OS Enhancements and New Features from Cent OS

1. In addition to keeping compatible to CentOS, EulerOS focuses competitive technology features in the system's high reliability, high security, and high serviceability.
2. EulerOS equally supports ARM64 and X86_64 as 2 major platform.
3. Euler OS is provided as one component of NCE, when there is OS patches, NCE will integrated and validated by R&D before publish.



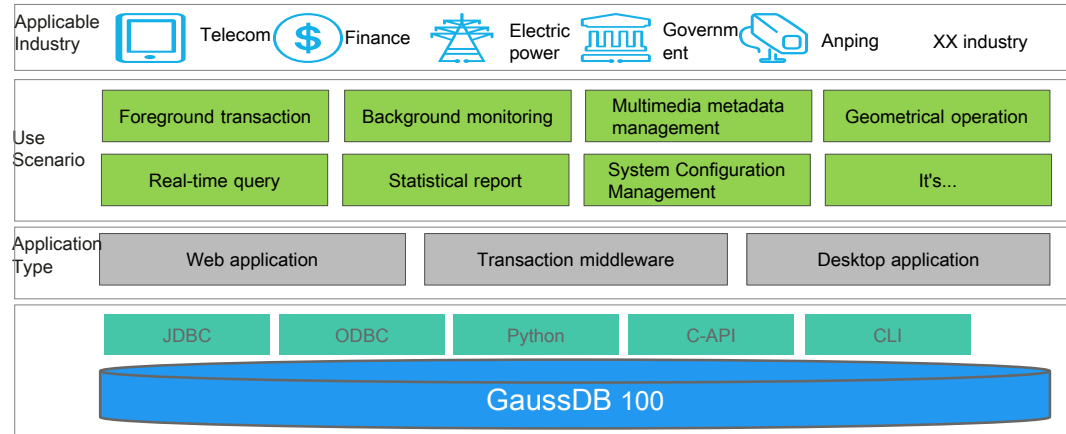
Enhancement	EulerOS Feature
High reliability	Sysmonitor, KBOX, Kdump, Hang dead enhanced, top enhanced, and trace enhanced
High performance	Distributed acceleration, TIPC
Security hardening	Tailoring, security library functions, and system configuration security hardening
Engineering capability	Upgrade, log, and health checks

TIPC: Transparent Inter-process Communication
 PCIE: Peripheral Component Interconnect Express
 TPM: Trusted Platform Module
 KBOX: Kernel black box



Basic SW - Gauss DB : Autonomous and controllable fully self-developed enterprise OLTP database

Ultimate performance, Secure and reliable, Easy to use



Supported Hardware Platform

- Universal PC server based on x86_64.
- Huawei Taishan (Taishan) server based on ARM chips
- Local storage (SATA, SAS, and SSD)
- More than 1000 Mbit/s Ethernet network.

Supported Operating Systems

- EulerOS Linux Enterprise Server 2.8

Standard

- Supports the SQL:2003 standard and SQL:2006 to SQL:2016 series standards.
- Supports the UTF-8 character set.
- Supports JDBC, ODBC, PYTHON, GO, and C-API

Zhejiang Mobile

China ICBC Bank

China MerChants BANK

200+ global commercial deployments for finance, government, and telecom

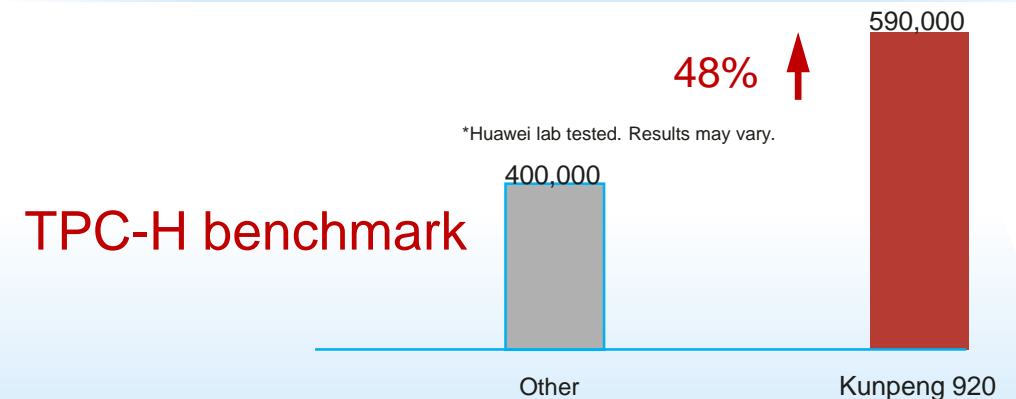
High performance

Single node million tpmC, performance **30% higher**

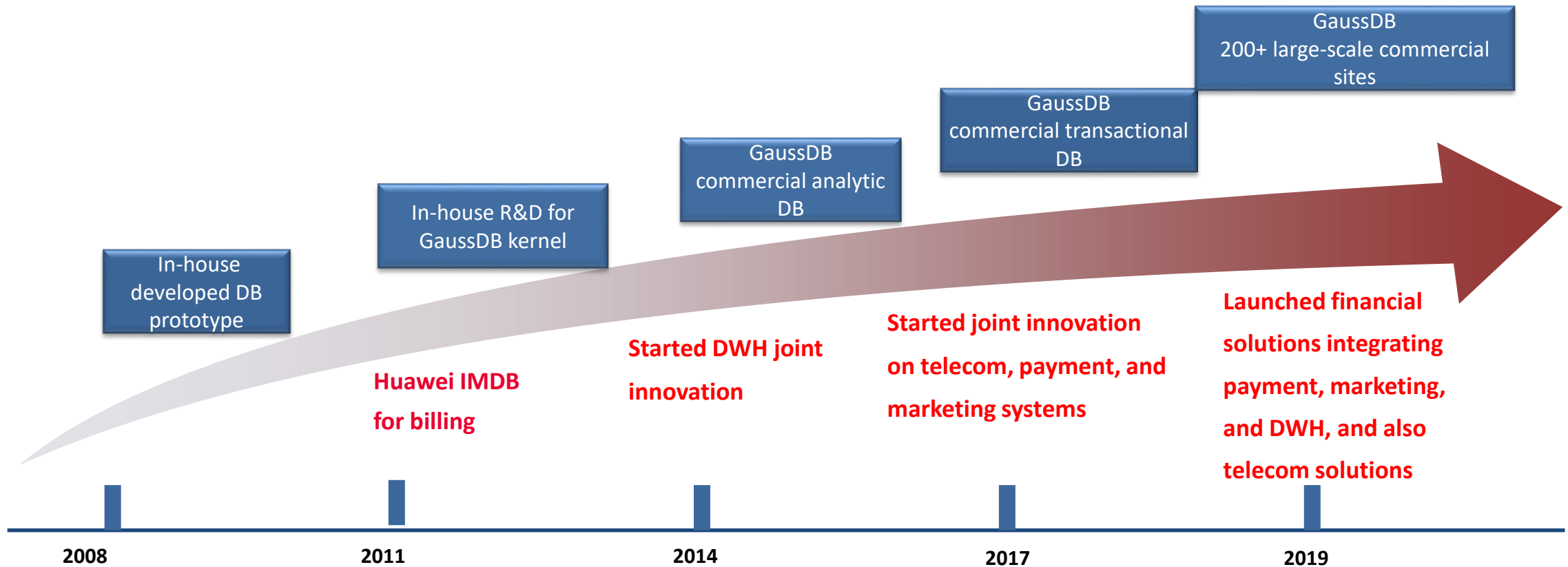
The Key Performance between NMS and database is to insert & read data in batches
75% scenario is better than other DB, **25% scenario exceeds 100%**(Lab test)

The first ARM enterprise database

Kunpeng-powered hyper-parallel technology

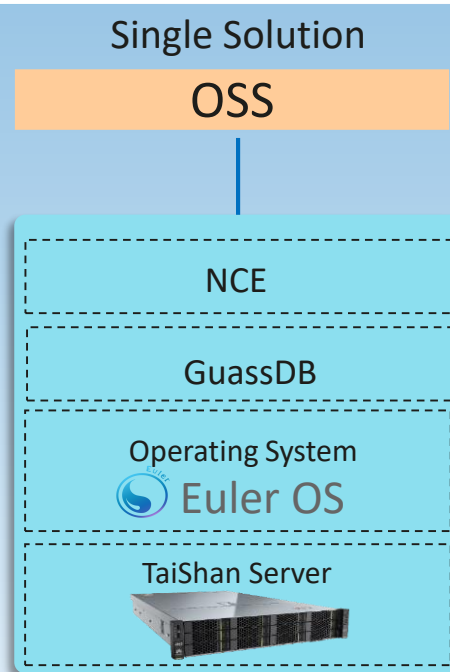


Basic SW - Gauss DB : Enterprise Database Leveraging Huawei's 10+ Years of Research and Practice



- 10+ years of R&D in database technology
- Expert R&D teams in 7 Huawei research centers

Remote Protection(Active/Standby) Deployment Solution

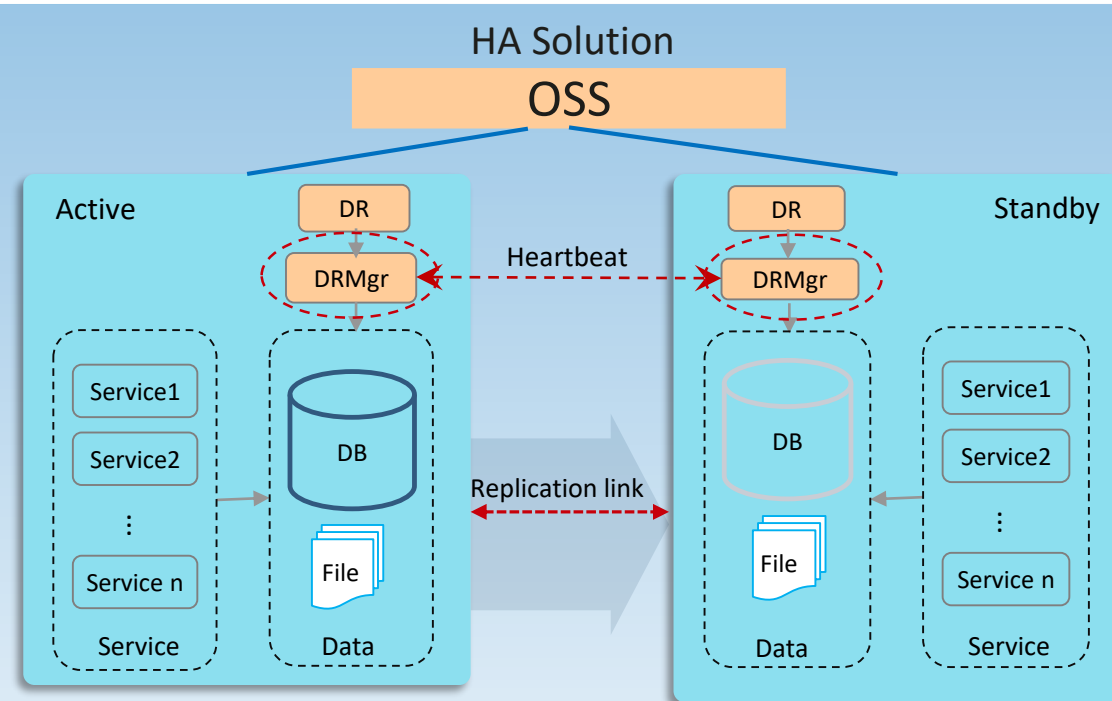


Data backup and restore(Cold backup)

- Support **timing backup and restore** by NCE
- Support **remotely backup and restore** by NCE

Risk:

- No any protection, and system restoring spend more time.
- No Real time data synchronization
- High bandwidth: 1.5Gbit/s



Data real time synchronization, no data loss(hot backup):

NCE data includes database data and non-database data.

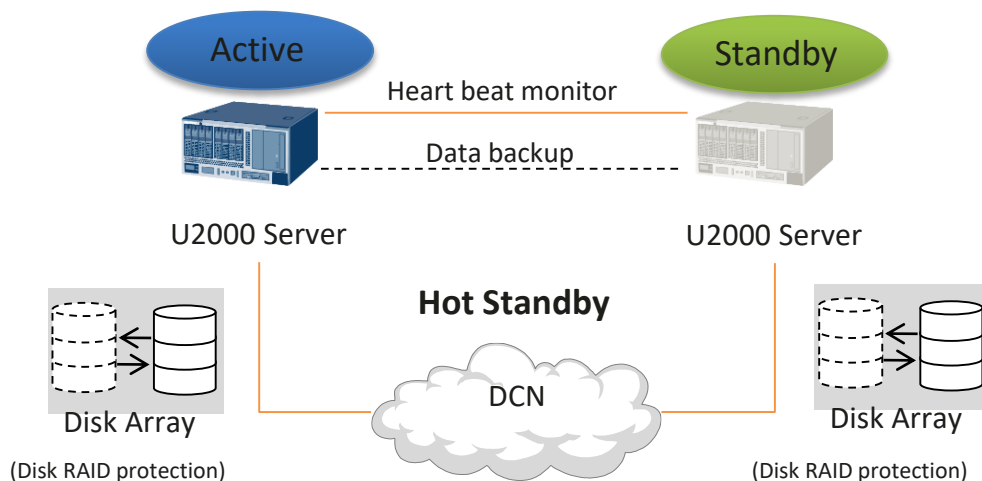
- Database data: GuassDB uses the data synchronization mechanism to replicate data
- Non-database data: Configuration files through HFS(Hierarchical File System)

Replication link

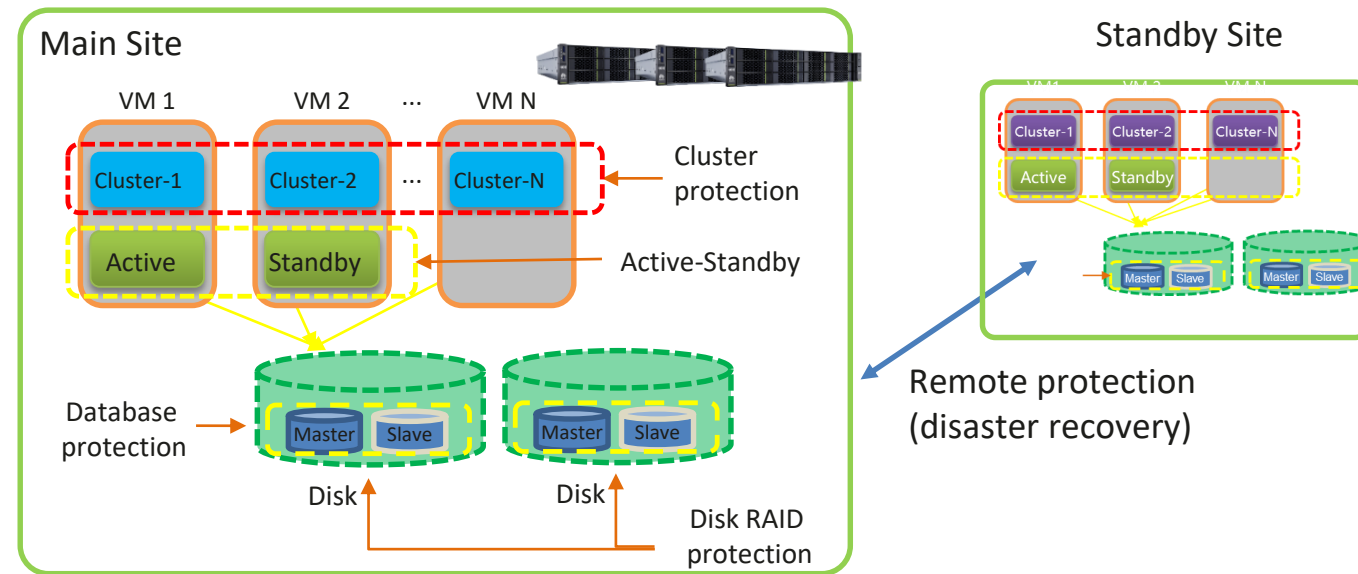
- Network delay <50ms; Packet loss rate <0.1%
- Recommend Minimum bandwidth between sites 6K/60Mbit/s 15K/100Mbit/s

NCE: Protection Mechanisms Improve System Availability

U2000 HA Solution



NCE HA Solution



		U2000	NCE (Distribute Mode)
local protection (In site/ Distribute Deployment)	Application protection	NA	Cluster : ~ 0s
	Database protection	NA	Active-Standby: RTO < 1 min
	Disk RAID protection	RAID0,RAID10	Master-Slave: RTO< 60 sec
Remote protection (Between Sites)	Database synchronization	< 60 sec	RAID0,RAID10
	Recover time	15 mins	< 60 sec
			15 mins

NCE Manager Inherits U2000 functions, eg NCE-T

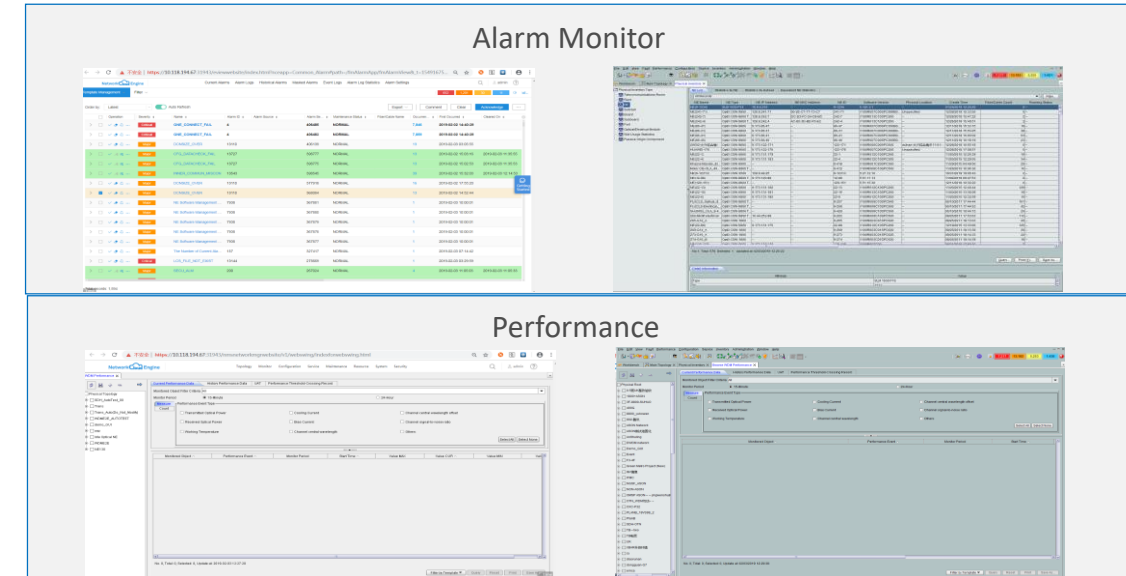
1

NCE-T Manager inherits U2000-T management features

Feature	U2000-T Sub-Feature	NCE-T (Manager)
Resource Management	Resource Discovery and Visualization	✓
	Inventory Management	✓
Network Configuration	Single NE configuration	✓
	NE Batch configuration	✓
Alarm Management	Alarm management at both the NE and network levels	✓
Performance Management	Performance management at both the NE and network levels	✓
Service Management	Service E2E provisioning	✓
	Service E2E management	✓
NE Software Management	Manage NE software and upgrading or downgrading NE software	✓
DCN Management	DCN configuration and View	✓
Log Management	NMS and NE log Management	✓
Task Management	Scheduled tasks Management	✓
Security Management	NMS Security Management	✓
	NE Security Management	✓

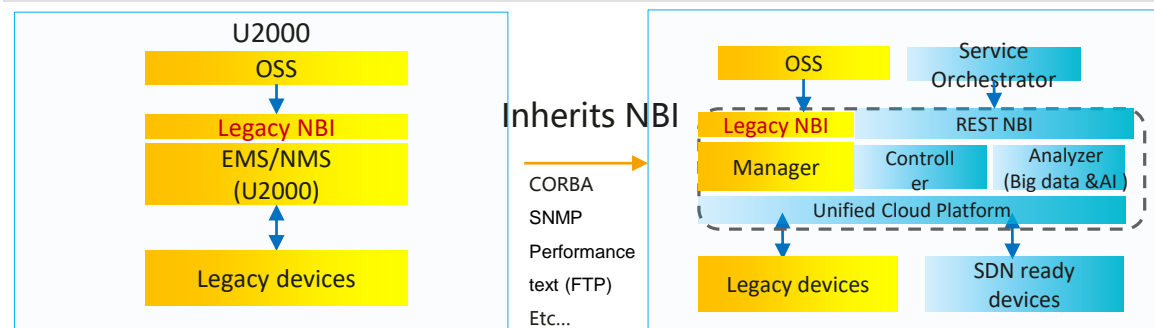
2

Similar GUI experience in NCE Manager module



3

NCE NBI Includes U2000 Legacy NBIs



4

NCE-T supports all WDM and SDH series NE (Excluding EOS NE)

MSTP Series OptiX Metro 100 OptiX Metro 1000V3 OptiX Metro 1050 OptiX Metro 1100 OptiX Metro 200 OptiX Metro 3100 OptiX Metro 500	OSN Series OptiX OSN 1500 OptiX OSN 2000 OptiX OSN 2500 OptiX OSN 2500REG OptiX OSN 3500 OptiX OSN 3500H OptiX OSN 50 OptiX OSN 500 OptiX OSN 550 OptiX OSN 680 OptiX OSN 7500 OptiX OSN 7500 II OptiX OSN 80 OptiX OSN 9500 OptiX OSN 9500	SDH series OptiX 10G MAD/Metro5000 OptiX 155/622 (Metro 2050) OptiX 155/622B OptiX 155/622H OptiX 155/622H(Metro 1000) OptiX OSN 1832 X16 OptiX OSN 1832 X4 E OptiX OSN 1832 X8 OptiX OSN 1832 X8 E OptiX OSN 2500+ OptiX 2500+ (Metro 3000) OptiX 2500REG	NG WDM series HUAWEI OSN902 OptiX OSN 1800 I/E OptiX OSN 1800 I/I OptiX OSN 1800 II/E OptiX OSN 1800 III(Packet) OptiX OSN 1800 V OptiX OSN 1832 OptiX OSN 1832 X16 OptiX OSN 1832 X4 E OptiX OSN 1832 X8 OptiX OSN 1832 X8 E OptiX OSN 8800 OptiX OSN 8800 OptiX OSN 8800 T16 OptiX OSN 8800 T32 OptiX OSN 8800 T64 OptiX OSN 9600 OptiX OSN 9600 M24 OptiX OSN 9600 F32 OptiX OSN 9600 U16 OptiX OSN 9600 U32 OptiX OSN 9600 U64 OptiX OSN 9600 M24 OptiX OSN 9600 P32 OptiX OSN 9600 U16 OptiX OSN 9600 U32 OptiX OSN 9600 U64	LH WDM and Metro WDM series OptiX BWS 1600G OptiX BWS 1600G OLA OptiX BWS 320G (OAS/OCI/OIS) OptiX BWS 320GV3 OptiX Metro 6020 OptiX Metro 6040 OptiX Metro 6040V2 OptiX Metro 6100 OptiX Metro 6100V1 OptiX Metro 6100V1E OptiX OSN 900A OptiX OTU40000
---	---	--	---	---

U2000 vs NCE Comparison Summary

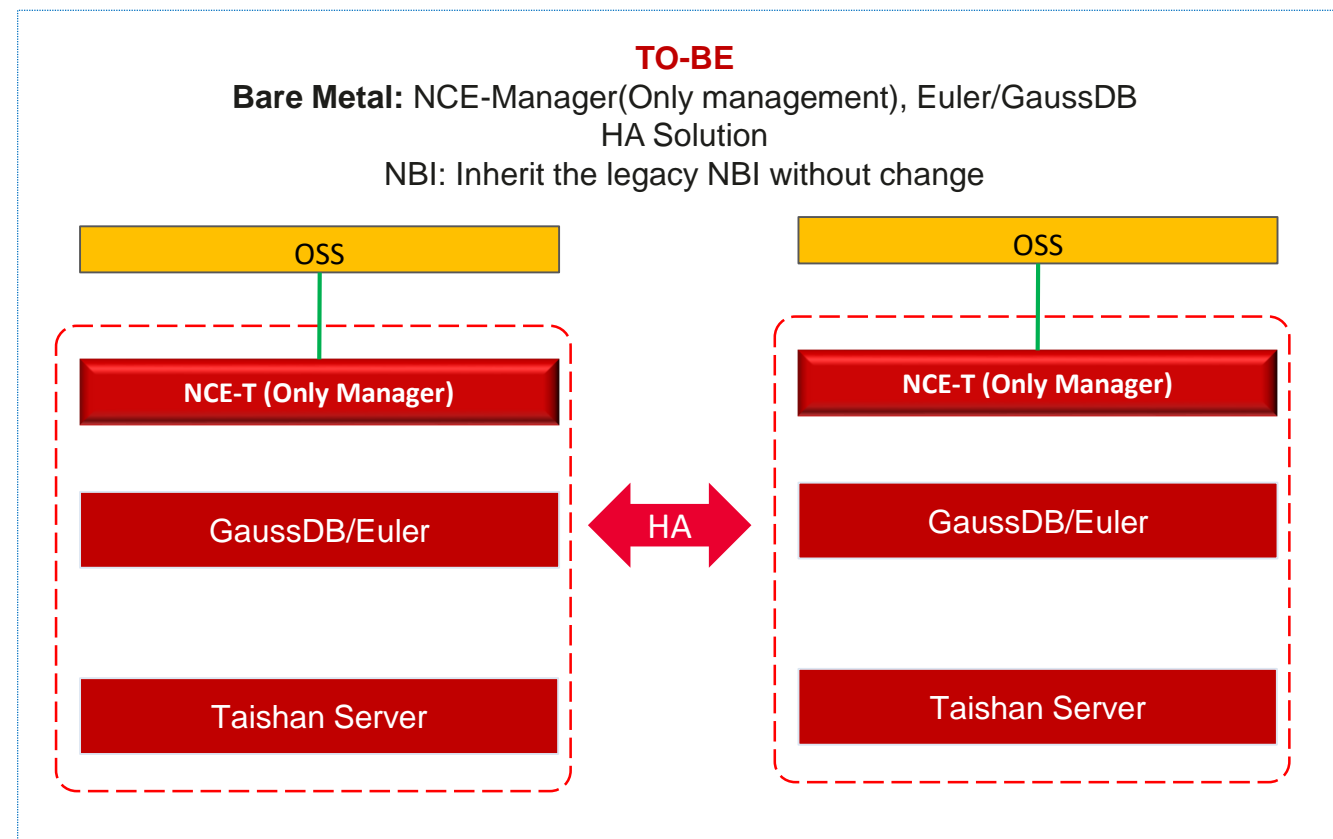
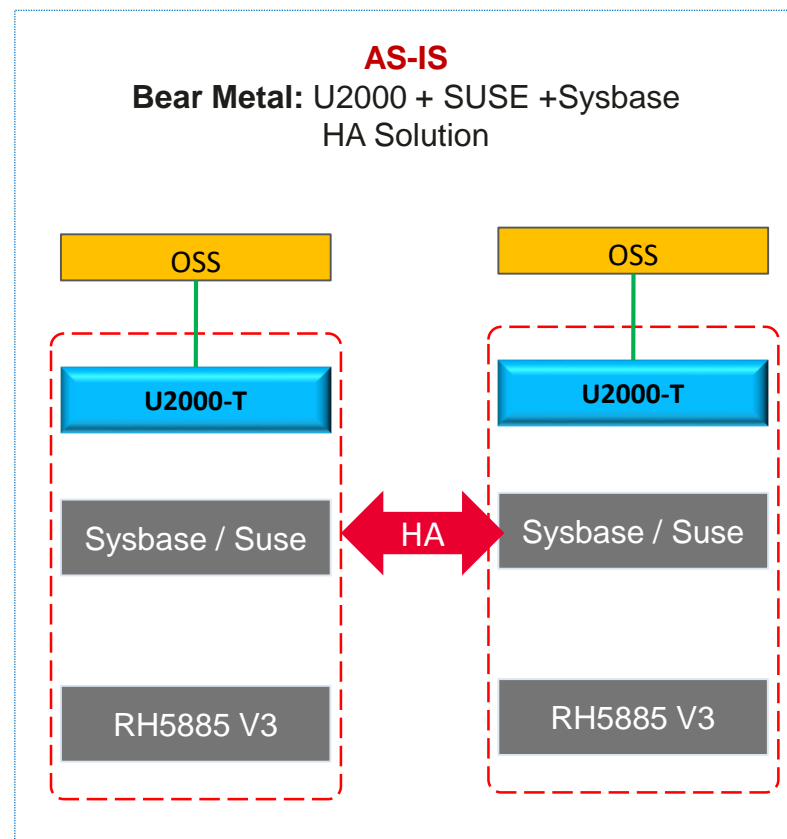
<u>Items</u>		<u>U2000</u>	<u>NCE</u>
Architecture		<ul style="list-style-type: none"> C/S architecture. The client must be installed for each customer, the download and installation are complex. 	<ul style="list-style-type: none"> B/S architecture, cloud-based architecture for next generation. Web Portal, browser is client.
Basic platform	Deployment	<ul style="list-style-type: none"> On-Premises deployment Scheme Private cloud deployment Scheme Scale expansion needs hardware replacement, max 30K equivalent NEs 	<ul style="list-style-type: none"> Distributed deployment On-Premises deployment Scheme Private cloud deployment Scheme Component deployment on demand, from 2K to 50K+ equivalent NEs (Distributed deployment)
	Basic SW&HW	<ul style="list-style-type: none"> 3rd party OS & DB 3rd party & HW Server 	<ul style="list-style-type: none"> HW Euler OS & Gauss DB HW TaiShan 2280 V2
	Reliability	<ul style="list-style-type: none"> Only two-node cluster protection is provided, and no component-level protection is provided. 	<ul style="list-style-type: none"> Two-node cluster protection, multi-instance application-level protection
Software Feature	O&M Experience	<ul style="list-style-type: none"> Distributed O&M based on functional modules FCAPS Based Single Function GUI and operation Flow 	<ul style="list-style-type: none"> One-stop O&M based on services, easy to operate User centric design based on Aurora UI 2.0, scenario-based operational flow and user experience. Towards automation & intelligence network
	OSS Integration NBI	<ul style="list-style-type: none"> Standardized northbound interfaces, the Integration is complex, time-consuming, and costly. 	<ul style="list-style-type: none"> Inherit U2000 Standardized northbound interfaces Provides scenario-based and service-level APIs, simplifies OSS/APP development, shortens interconnection time, and reduces costs. (Integration time from month to week)

Contents

1. What & When: Comparison of U2000 and NCE

2. How: Smooth Migration from U2000 to NCE

OP from U2000-T to NCE-T in Portugal ALTICE

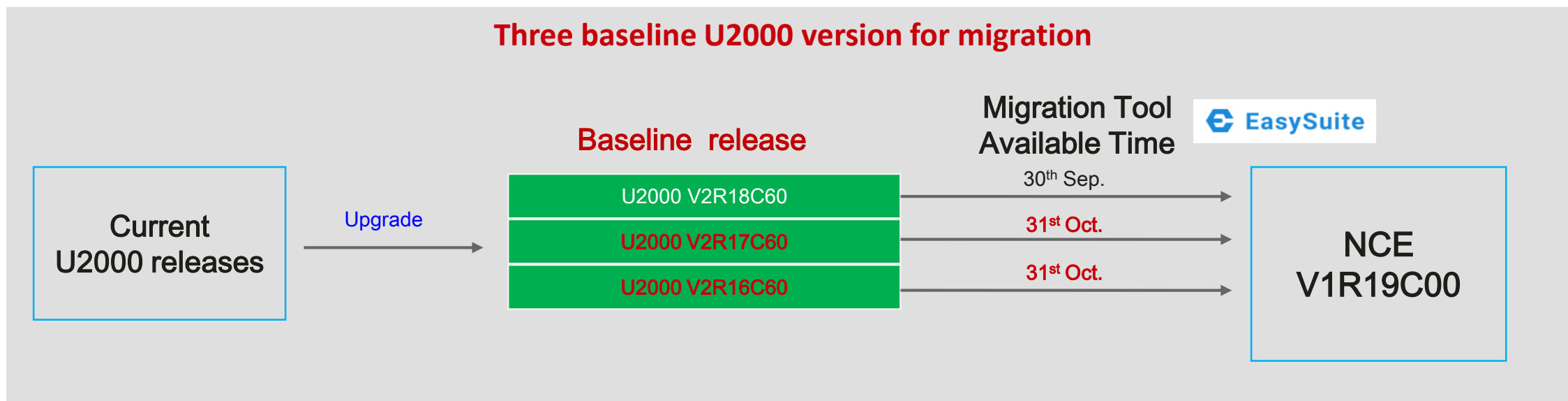


Portugal Live Equivalent NEs

<6K

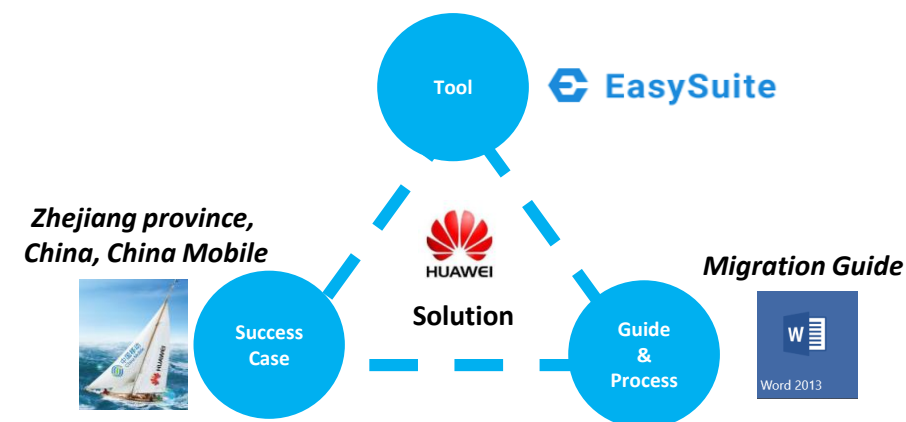
Scenario	Scale	TaiShan Server	TaiShan Number	Ready Time
Bare Metal (Only-Management)	Equivalent NEs<=15K	2*48Core,384G,12*1200G SAS HDD	1*2	30.9.2019

Migration Path and Available time

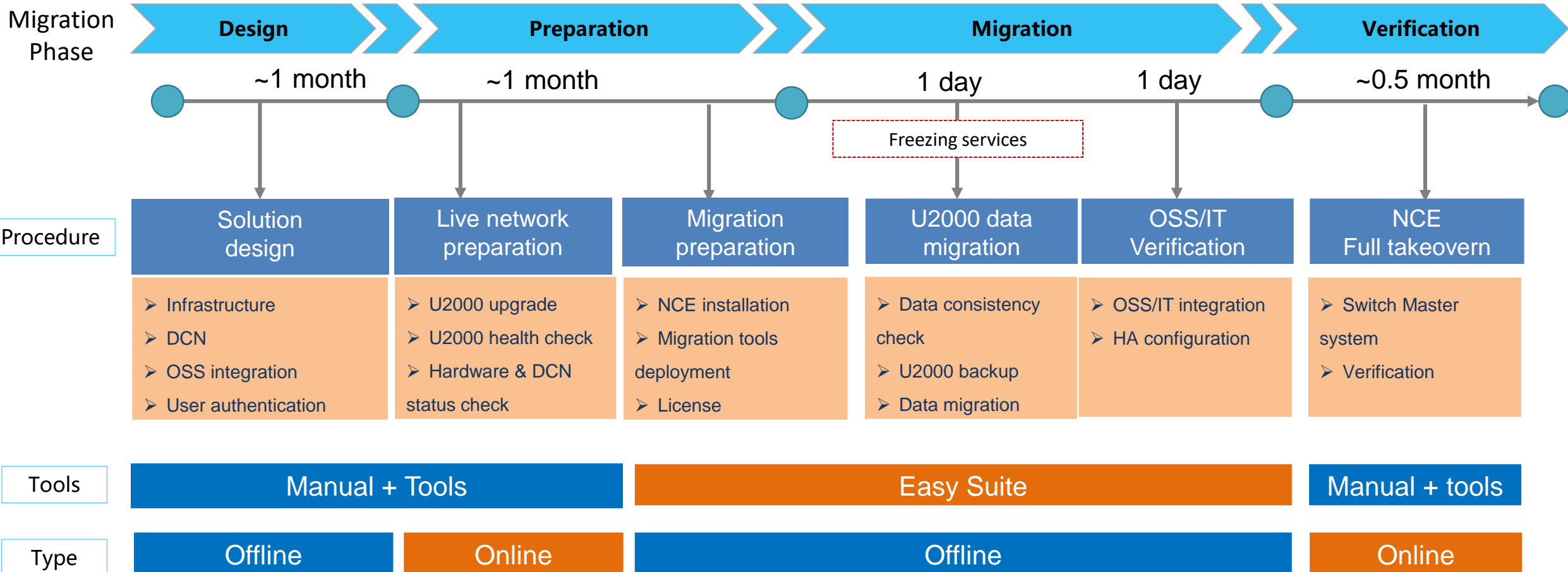


- DB migration tool of Easy Suite to ease the migration procedure from U2000 to NCE.
- Easy Suite is a web tool running with web browser (default with Chrome), it communicates with the source U2000 and target NCE by SSH protocol. Migration tool is more efficient than traditional script way.
- The migration from U2000 to NCE has no impact on the live network, no monitoring interruption, only need to freeze network from configuration and provision. The freeze time based on live equivalent NEs.

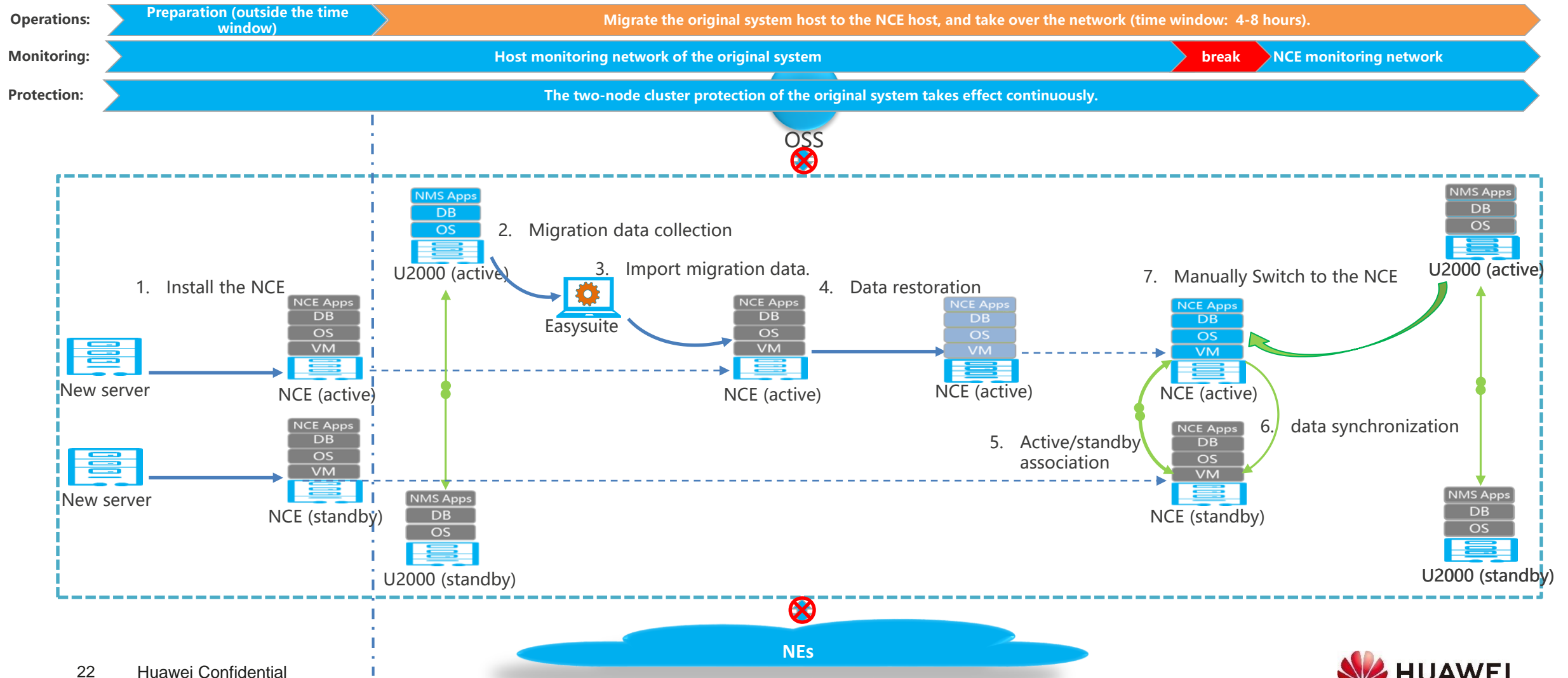
Eg. NCE-T : 6K ~4Hours, 15K ~6Hours, 30K ~8Hours



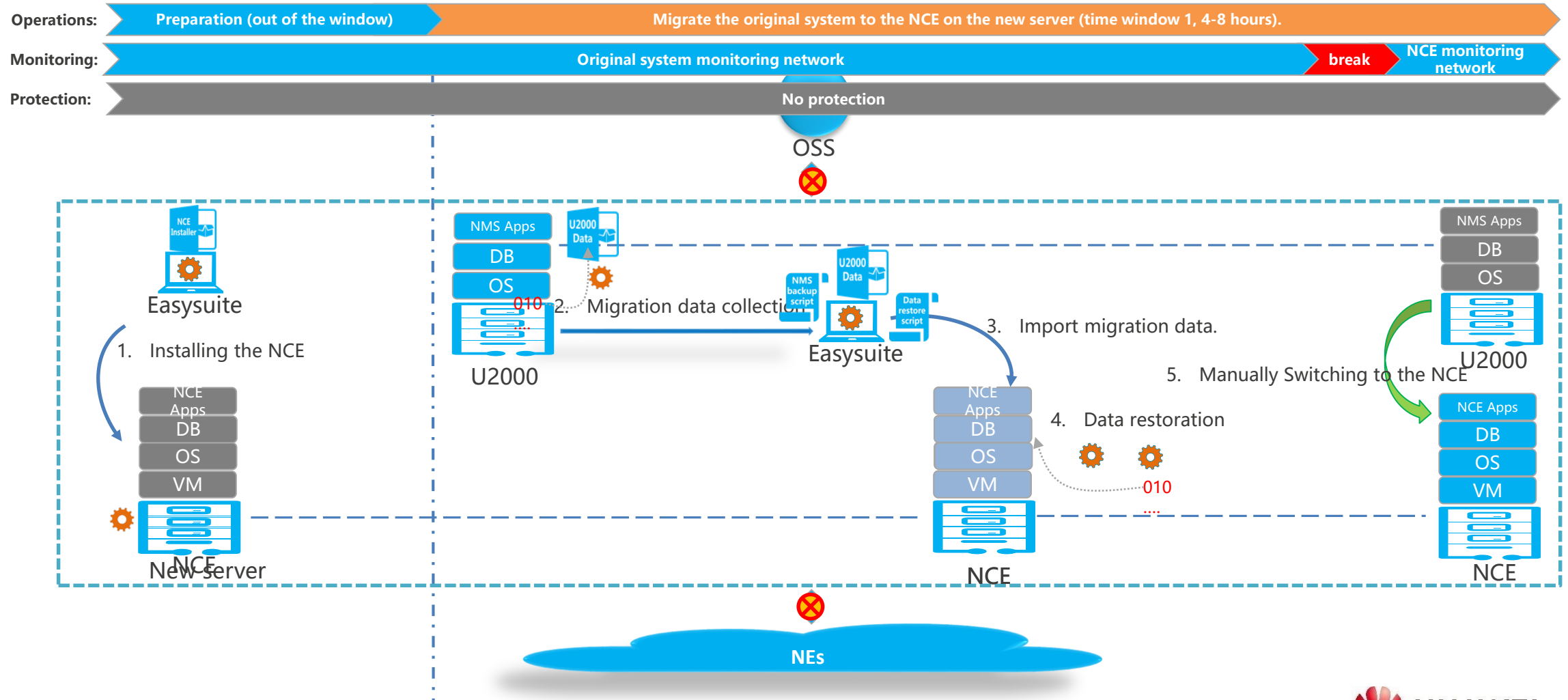
Detailed procedure for U2000-T migration to NCE-T



For a two-node cluster, replace the server. The implementation takes a short time, and the two-node cluster protection takes effect.



Replacing a server in a single-node system: The new and old systems monitor the network alternately and the interruption time is short.



Thank you.

Bring digital to every person, home, and organization for a fully connected, intelligent world.

**Copyright©2018 Huawei Technologies Co., Ltd.
All Rights Reserved.**

The information in this document may contain predictive statements including, without limitation, statements regarding the future financial and operating results, future product portfolio, new technology, etc. There are a number of factors that could cause actual results and developments to differ materially from those expressed or implied in the predictive statements. Therefore, such information is provided for reference purpose only and constitutes neither an offer nor an acceptance. Huawei may change the information at any time without notice.

