

Shaping the Network of the Future

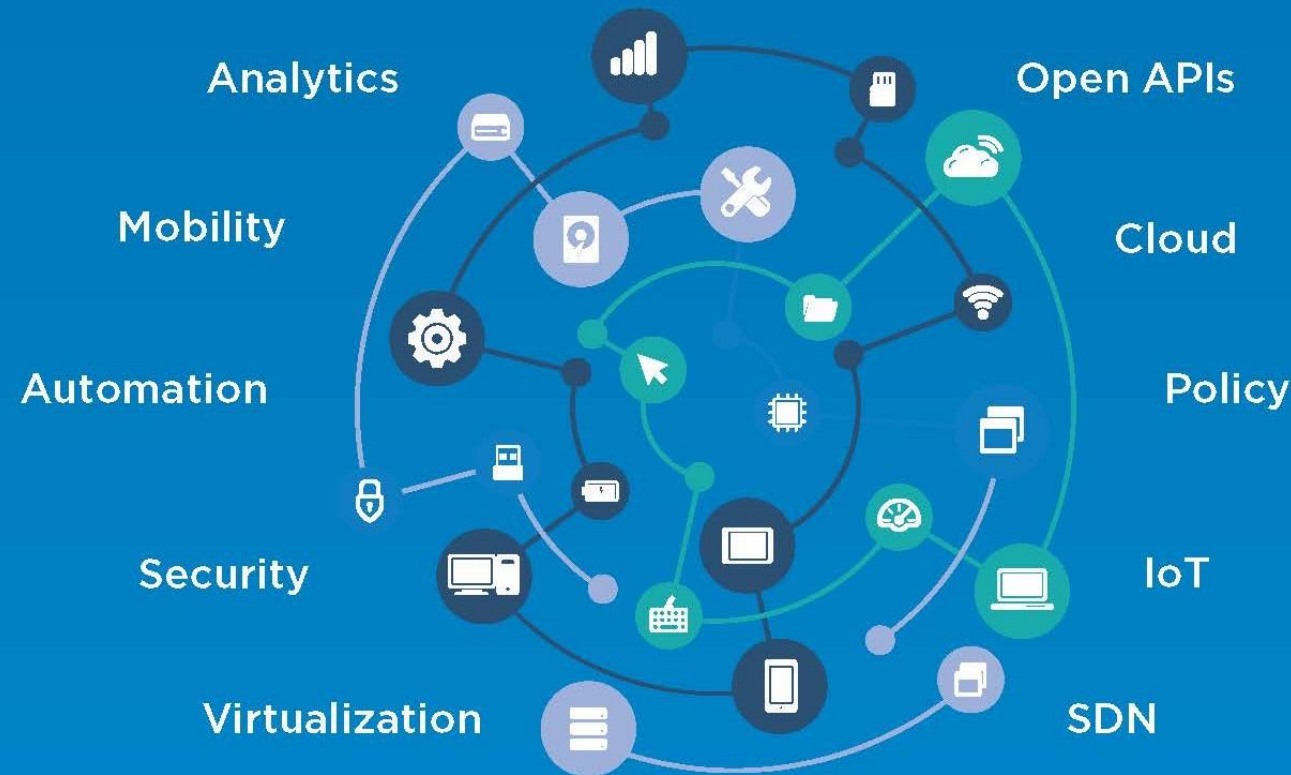
Accelerating Digital Transformation of Edge Cloud, SD-WAN and NFVi in 5G Era

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2019/12/12



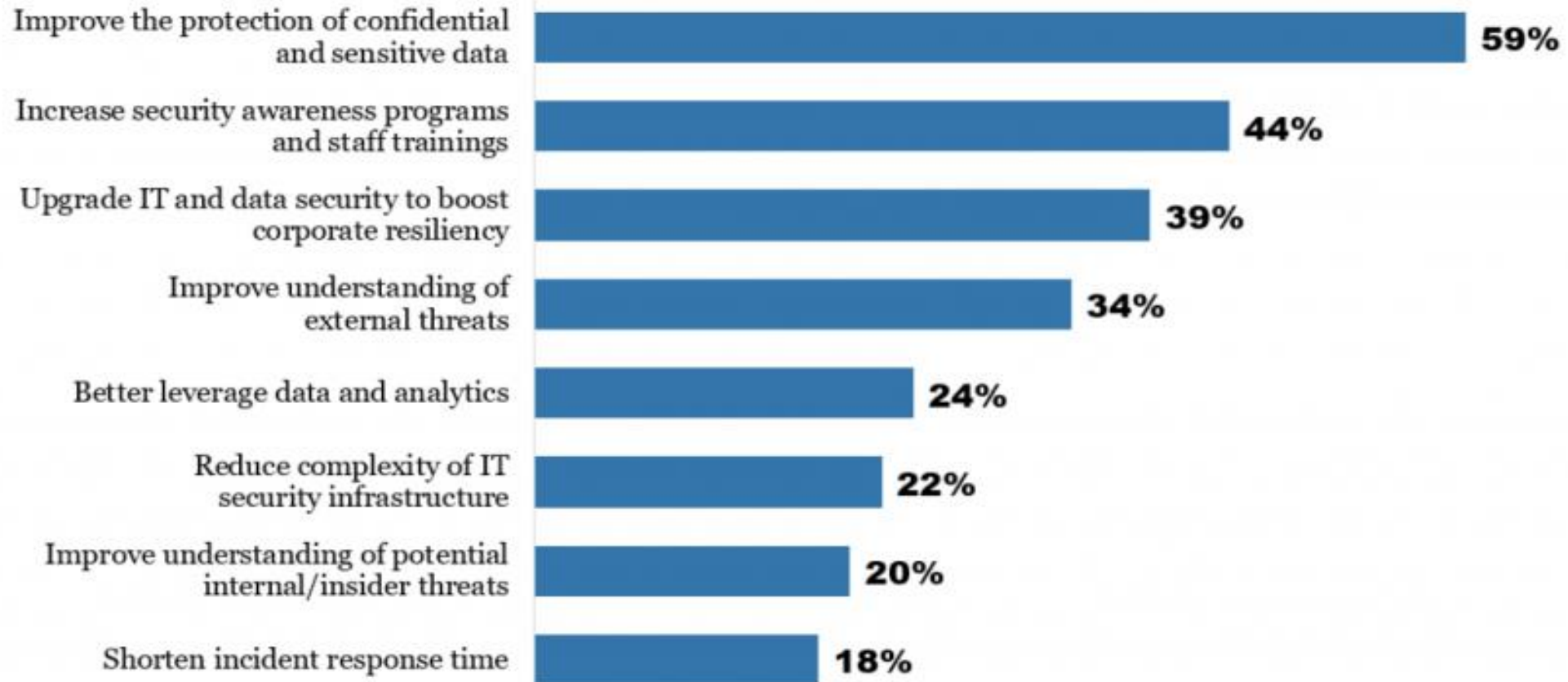
The Move to Network Digital Transformation

Bringing disparate network trends and innovations together to support digital era needs.

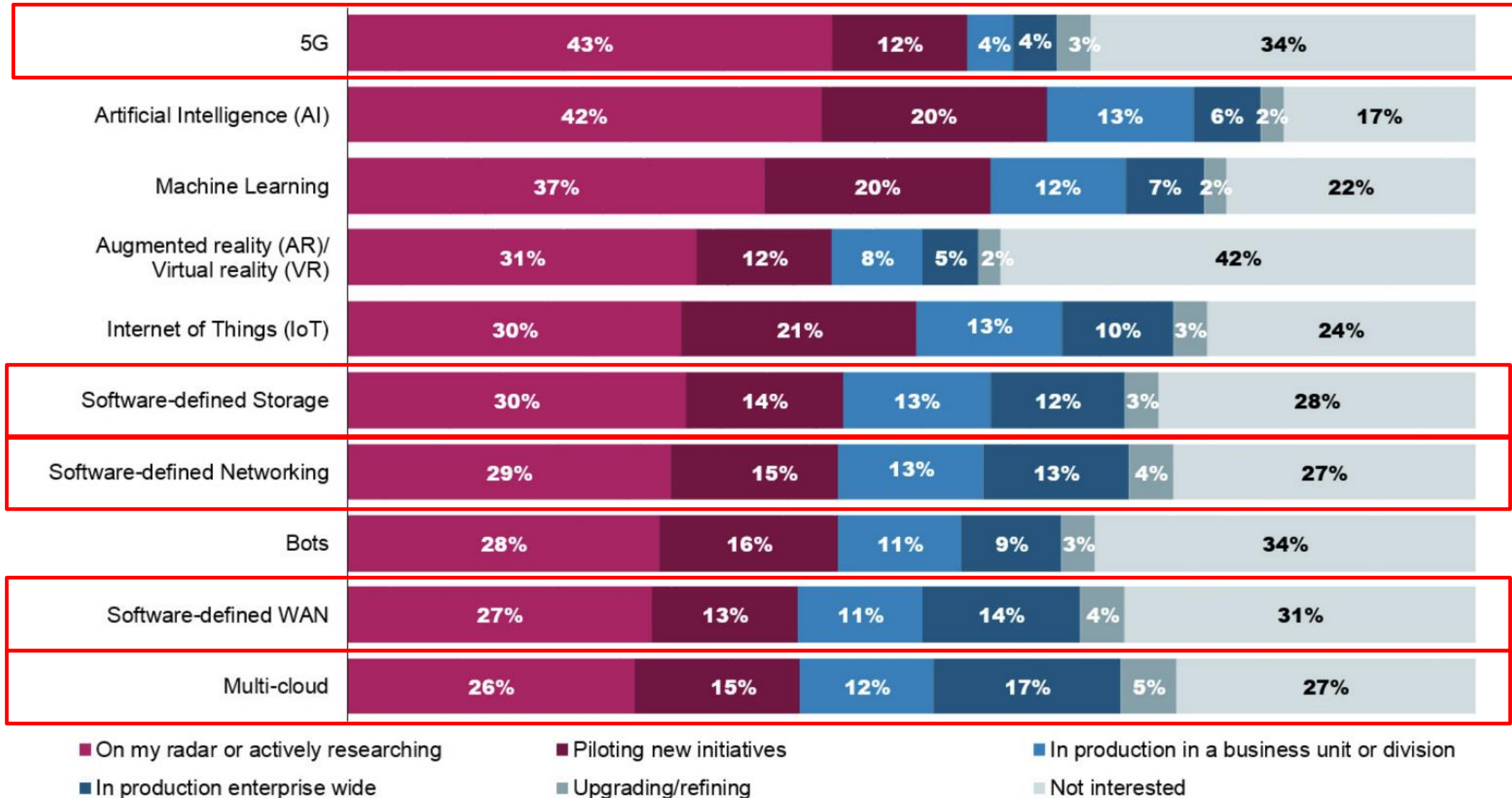


Market IT Spending Research

-Top Priorities for the coming year



The Promise of New Technologies Being Explored



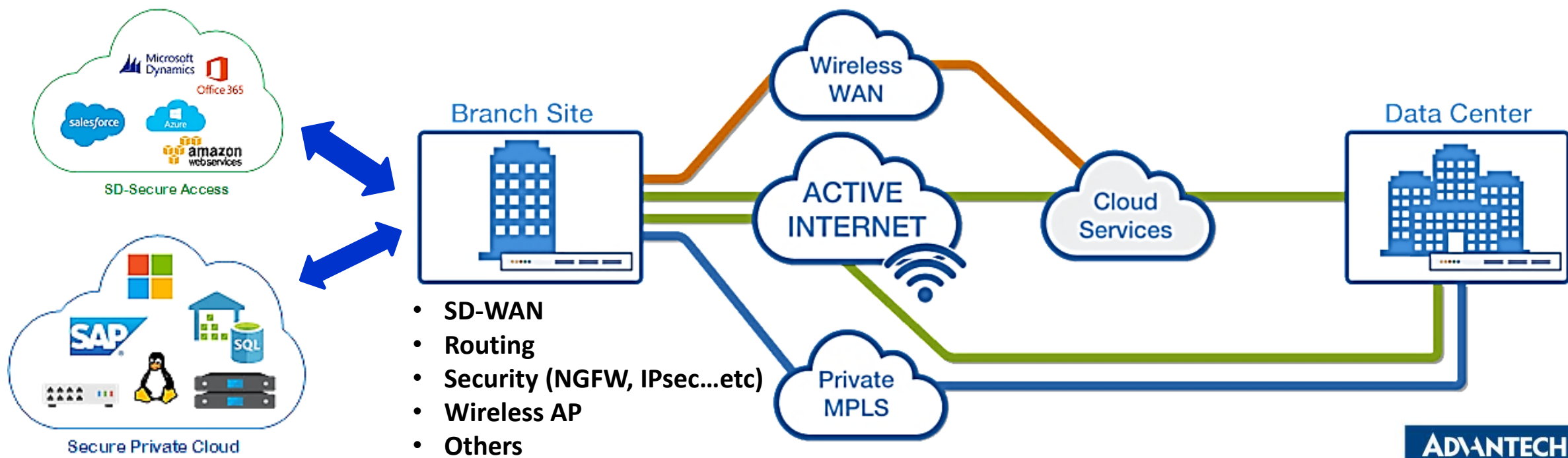
Source: IDG

Transforming: Network Function Virtualization

- Networking technology evolution – **Universal CPE**
- Paradigm shifting – Game rule is changed from a traditional closed network equipment vendor business model to an **open whitebox eco-integrated solution**
- Transform Cloud-IoT business logic, product portfolio and go-to-market strategy in this trend.
 - *Extend Cloud-IoT product design strength*
 - *Global leading NFVi Eco-partners engagement*
 - *Worldwide successful design-win case: Verizon, Comcast, CenturyLink, KDDI, TCL, Ali Cloud, Colt...etc.*
 - *Accumulated globally deployment: over 25,000 units*

From today's SD-WAN to future SD-Branch

- SD-WAN (Software-defined WAN) dramatically changes today's Enterprise IT infrastructure and projected market potential is up to \$6 billion in 2023.
- By leveraging the SD-WAN deployment, delivering the additional enterprise applications are going to be mainstream such as network security, load balancing & routing...etc then to become a **“SD-Branch”**.



SD-WAN Transformation at Enterprise Edge

Accelerate 5G and IoT with Cloud Connectivity

Any Deployment

Unified Management
(Cloud/On Premise)

Flexibility to deploy from months
to hours

Any Service

vFirewall

vRouter

vSwitch

vWAN Acceleration

Soft WiFi AP

Security Policy

Service Log

Central Management

SD-WAN Management

Agility to on-board new services
in minutes

Any Transport

Internet

4G LTE/5G

MPLS

More than 40% cost savings on
WAN operations

Any Location

Small branch
(>50 employees)

Medium branch
(50~250 employees)

Enterprise HQ
(>250 employees)

More than 55% time saving to apply
configuration changes

FWA-1012VC

- PoE
- 8 Ethernet

FWA-1112VC

- Wide Temperature
- IP4x
- Fanless

intel select solution

FWA-3050

- Up to 16C/32T
- PoE
- 120G Throughput

intel select solution

FWA-5070

- Up to 28C/56T
- 220G Throughput

Certified
WLAN/
WWAN

Full product
portfolio
to scale out

High
reliability
for non-stop
execution

Pre-validated
SD-WAN
solution

Zero touch
provisioning

2020



Enhance Cloud-IoT brand name as the leading NFVi whitebox provider in market



Continue Cloud-IoT new product technology innovation & investment for next wave



Strengthen the collaboration with worldwide leading Eco-partners (Software & Focus SI)

Creation of Advantech's 3rd Technology Pillar Forming CT-IT-OT Golden Triangle

Advantech OT Pillar

This is where we started
and have become a leading
force in OT market



IoT Gateways
Devices & Sensors

Advantech IT Pillar

Fully integrated private edge
Intelligence cloud

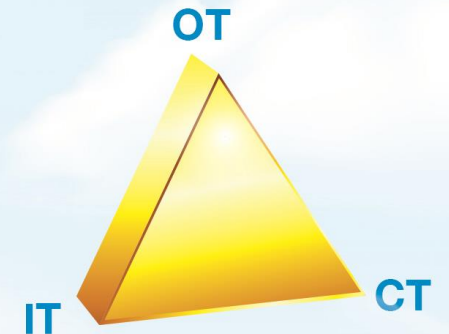


ADVANTECH
WISE-PaaS
AIoT Solutions & Marketplace

WISE-STACK

Advantech CT Pillar

Private Mobile Network
(企業 4G/5G 行動專網)

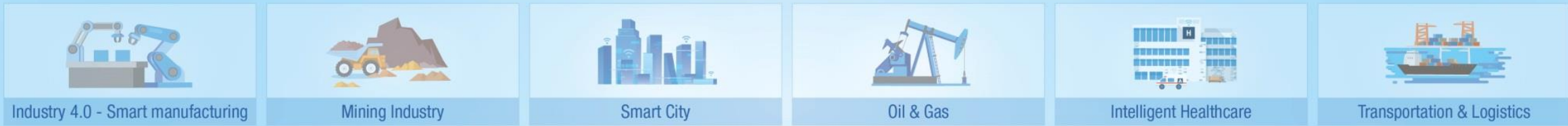


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SKY-8000 Servers for Private 5G Small Cell Mobile Networks

SKY-8000 私有5G移动专网服务器

Application Fields



HIGH PERFORMING

Dedicated bandwidth & improved QoS

MISSION CRITICAL

Ultra-reliable low latency

SECURE

Privately managed, cellular access

COST EFFECTIVE

Lighter infrastructure

Private LTE/5G Demonstrator w/ Advantech Intel Select Solution for NFVi



Software defined
Base station

Build around Red Hat or VMWare for: EPC, BBU, other MEC applications

Example:

- Edgecore ToR 10G & 100G
- 2x Control via SKY-8101 Single socket SP
 - HA Controller setup
- 4x Compute via SKY-8101D dual socket SP
 - 80G in and 80G IO out per socket
- 2x Storage via SKY-8201L dual socket SP
 - HA Storage setup



台灣電力公司
Taiwan Power Company



財團法人資訊工業策進會
INSTITUTE FOR INFORMATION INDUSTRY

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OpenRAN Collaborations



L2 + L3 Protocol Stack

Flow & CTRL
Disaggregated PHY

Radio Function
Virtualization
Management

NCTU's Soft PHY
based on
Intel FlexRAN

OS & Driver



BBU Server

Carrier Grade Short Depth SKY System

- Fronthaul & Backhaul: Ethernet
- Use 40 Xeon SP2 cores to support a 4x4 LTE Cell
- Optimization of Intel FlexRAN to achieve:
 - 400Mbps Uplink
 - >1Gbps Downlink
- *Without the use of any HW Acceleration*

Customers & Partners



ALTIOSTAR



CertusNet



ADVANTECH

5G Specifications Time Line



R15: Late 2019

- eMBB
- 5G phones and tablets

INVEST NOW!

Private Mobile Network Technologies

- Core Network Infrastructure
 - Small Cells
- Device and Gateway Interoperability
- Interconnection to Private Cloud Infrastructure

R16: Late 2021

- Unlicensed spectrum
- eMTC
- NB-IoT
- eURLLC

R17: Mid 2023

- 5G NR IoT enhancement
- NR-Light (low power for industrial sensors and wearables)
- Centimeter accuracy

➤ Interconnection to Private Cloud Infrastructure

HCI

(Hyper Converged Infrastructure)

超融合基礎架構

Data

Storage

Computing

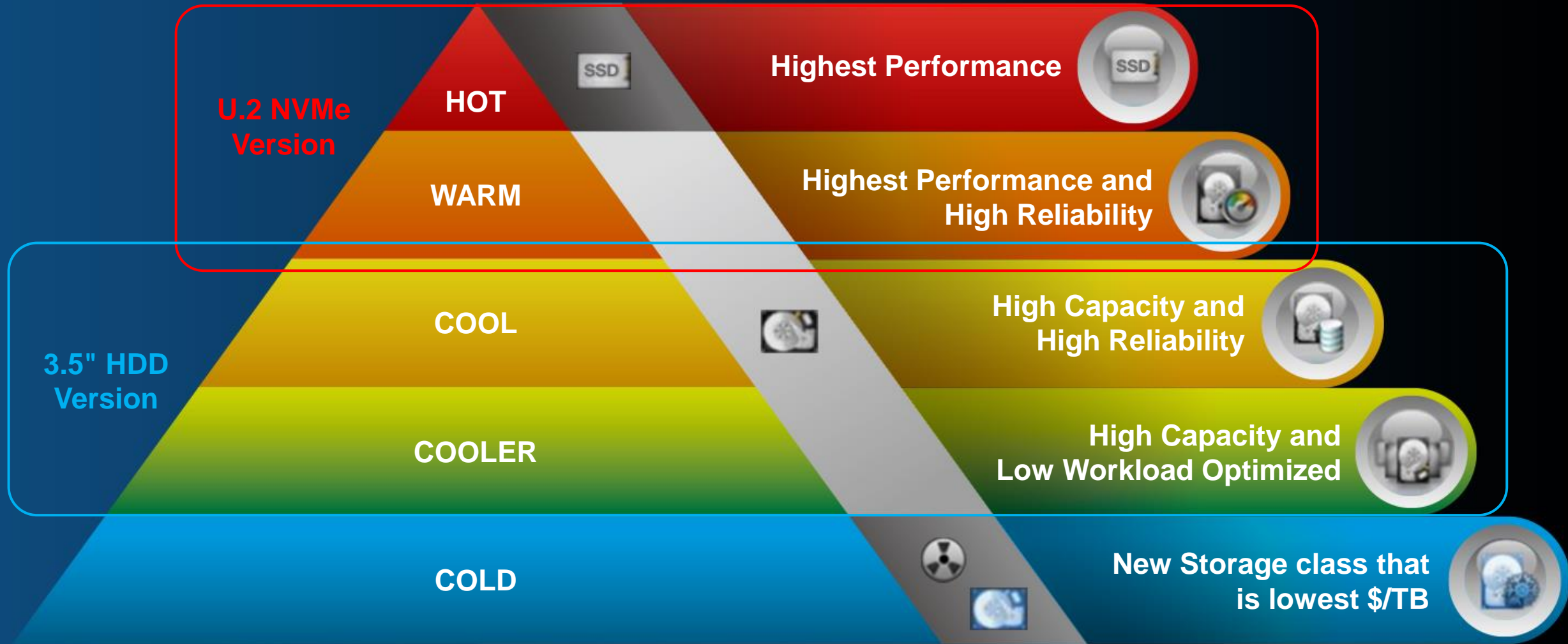
SDS

(Software Defined Storage)

軟體定義儲存

Flash

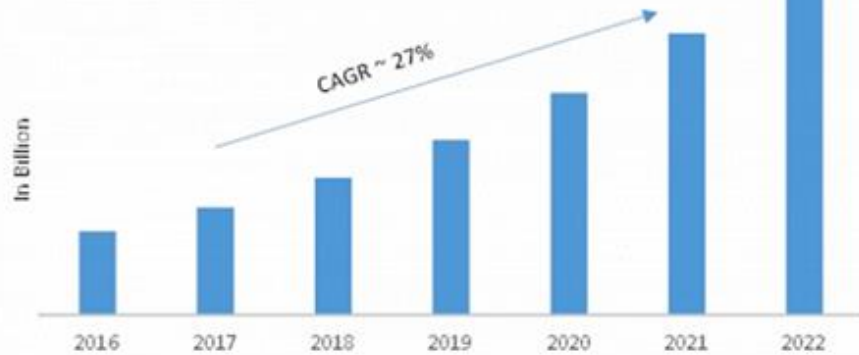
HDD vs SSD



SDS market Trends, Size and Growth by Forecast

CAGR 27%

~ 18 Billion

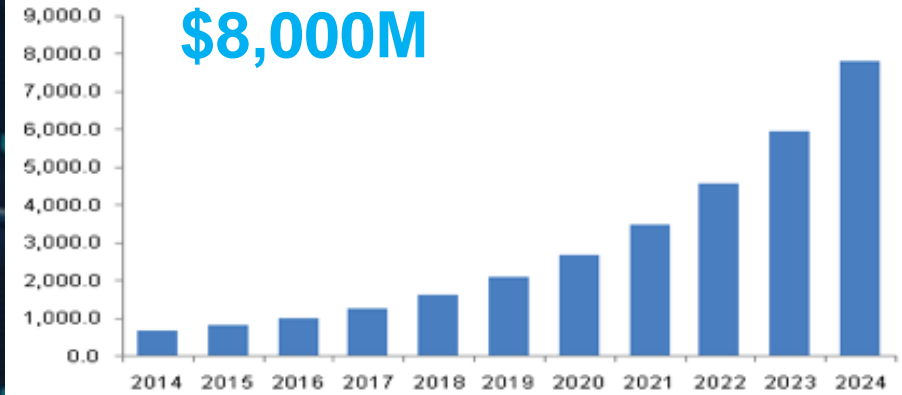


* Source : REUTERS, 2019

North America SDS Market revenue

USD Million

\$8,000M



* Source : Grand View Research

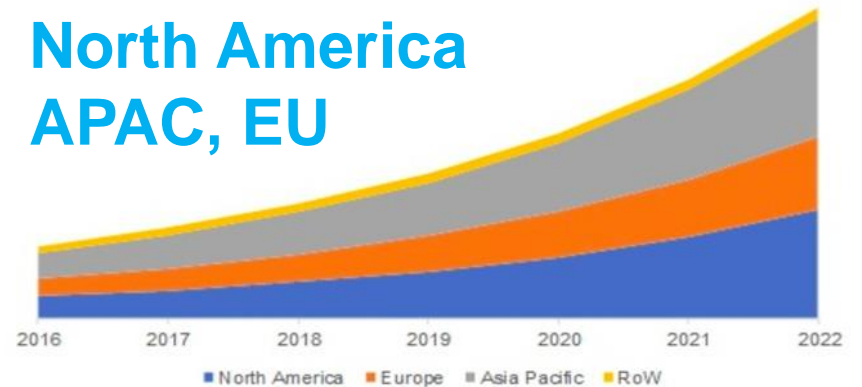
SDS

(Software Defined Storage)

軟體定義儲存

SDS Market By Region

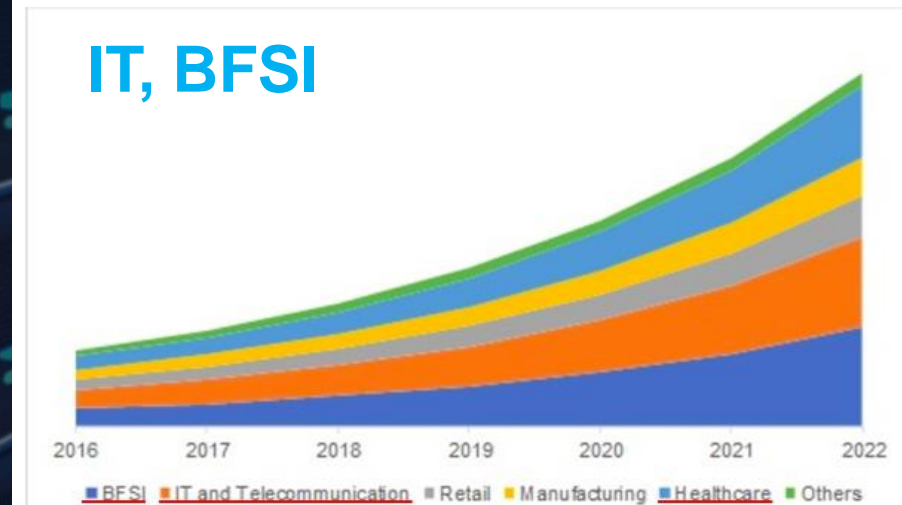
North America
APAC, EU



* Source : Market Research Future

SDS Market By Application

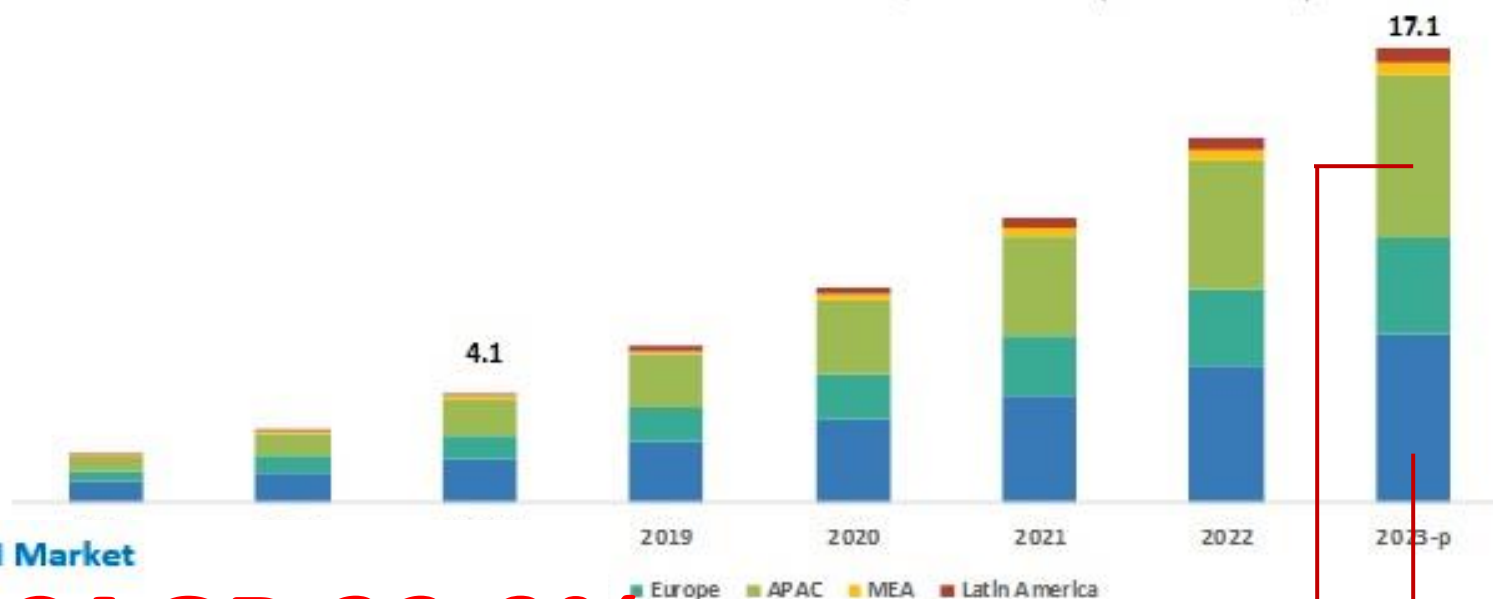
IT, BFSI



* Source : Market Research Future

HCI (Hyper Converged Infrastructure) 超融合基礎架構

HYPER-CONVERGED INFRASTRUCTURE MARKET, BY REGION (USD BILLION)



Attractive Opportunities in HCI Market

\$17.1B

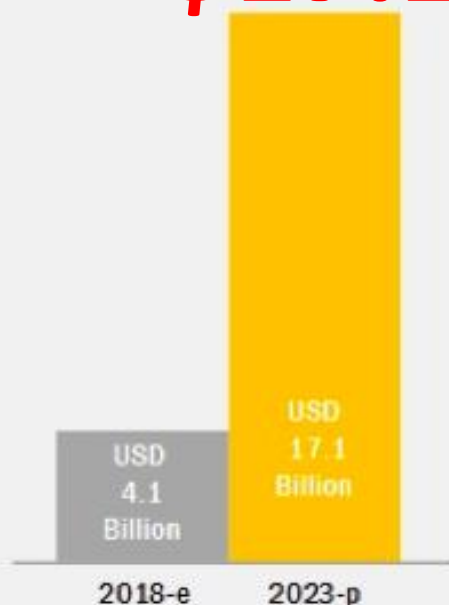
CAGR 32.9%

CAGR
32.9%

- The global Hyper-Converged Infrastructure (HCI) market size is estimated at USD 4.1 billion in 2018 and projected to reach USD 17.1 billion by 2023.
- Growing need for continuous application delivery, and increased awareness among enterprises about the benefits of HCI are expected to drive the market.
- Backup/recovery/disaster recovery is the fastest-growing application of HCI market, owing to rising concerns for faster data backup and security solutions, and a focus to lower total cost of ownership and operating expenses.

APAC

**North
America**



AFA (All Flash Array) Market Analysis

Attractive Opportunities in All Flash Array Market

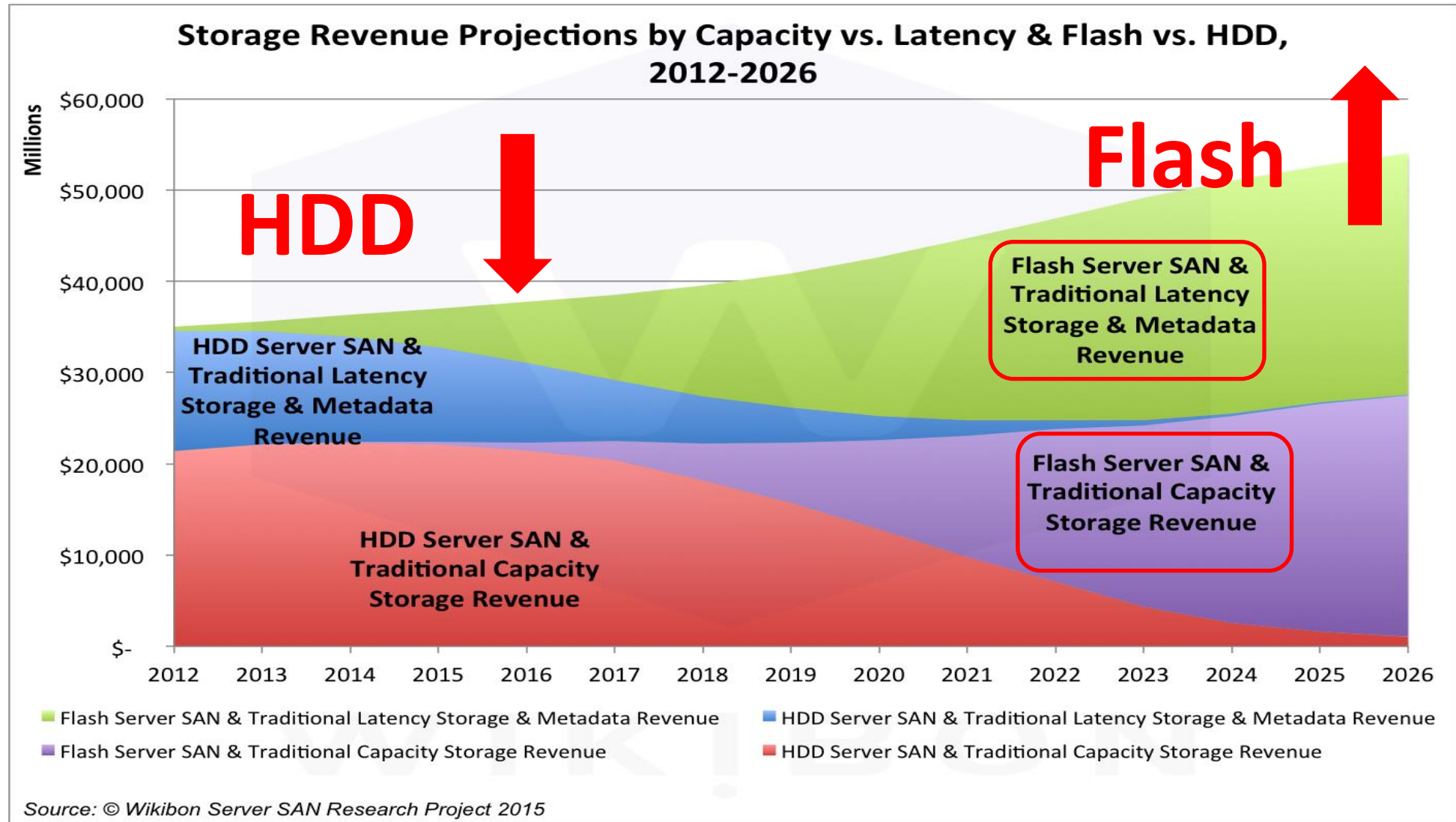
\$17.1B

CAGR 24.53%



Source : MarketsandMarkets Research

HDD vs SSD Storage Revenue Trends



Advantech to customers

HW platform + D&MS model

Strong backup for making better



HDD



M.2

U.2

Storage World

Customers

HW platform + D&MS model

Product Strategy for Storage

support customer's innovation with agility and technology

**Single-Node
Server**

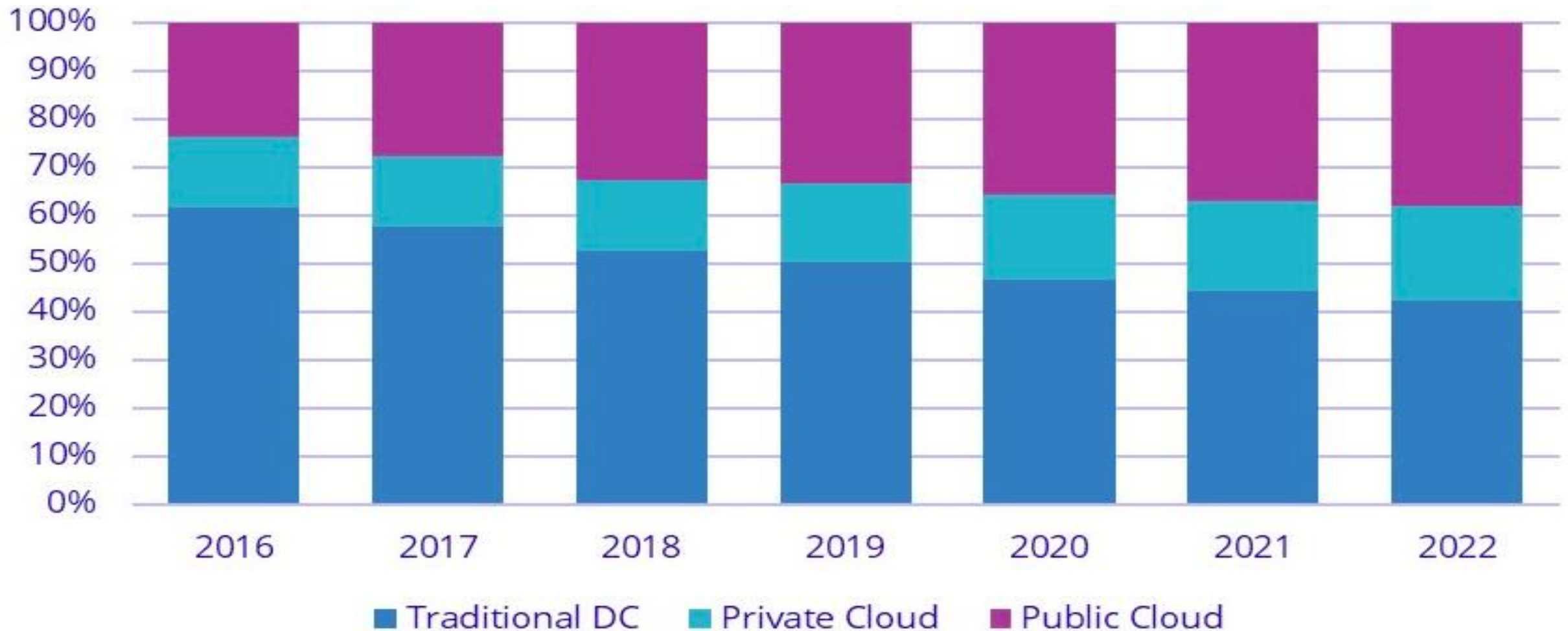
**Multi-Node
Server**

3.5" HDD

All Flash

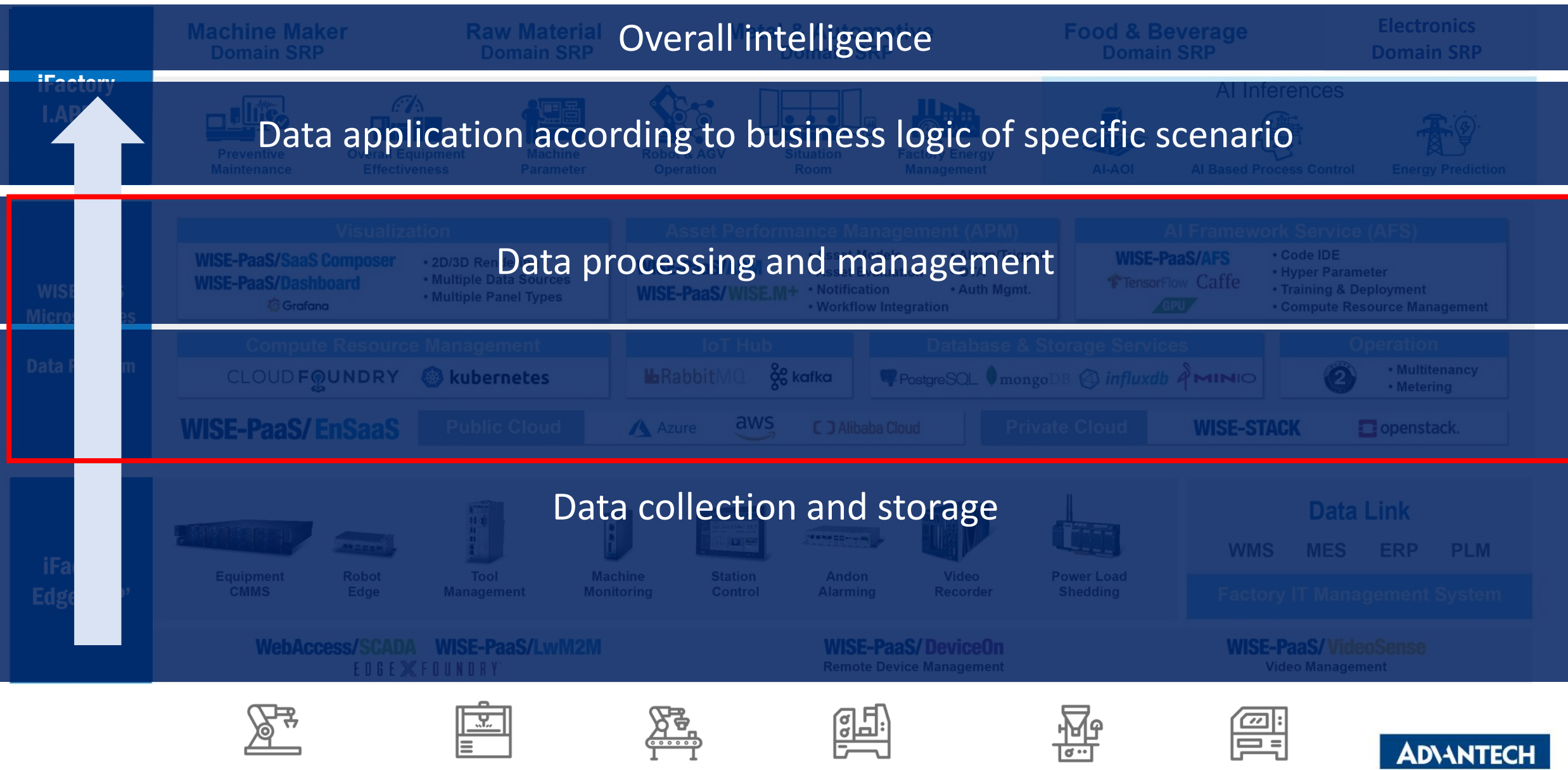


Worldwide Cloud IT Infrastructure Market Forecast by Deployment Type , 2016-2022



Shared based on value

iFactory/Industry 4.0 Digital Transformation with Data Driven Refactoring and AIoT



5 Imperatives Driving Edge Computing

Latency/Determinism

- Microseconds – to sub seconds
- Consistency - or not

Local Interactivity

- Locally collaborative – or Locally responsive
- Horizontal – or vertical

Data/Bandwidth

- Massive – or moderate
- Local value – or aggregated value

Limited Autonomy

- Occasionally autonomous – or fully dependent
- Self-organizing and discovering – or not

Resiliency

Privacy/Security

- Private/sensitive – or public
- Regulated/geospecific – or unregulated



Advantech WISE-STACK Private Cloud Solution

研华WISE-PaaS 私有云解决方案



- Privacy
- Continuous Operation

- Multi-tenancy Support
- Easy Expansion

- Enable IoT Solution
- Cost Effective

Micro-services



Container



Hardware Resource Management



Software Defined Infrastructure

WISE-STACK

WISE-STACK-200

On-premises Data Platform

- Operation Management
- 2D Dashboard
- Equipment & Device Management

WISE-STACK-300

CPU-based AI with 3D Visualization

- Operation Management
- 3D Dashboard
- Equipment & Device Management
- CPU-Based AI Framework Service

WISE-STACK-600

GPU Resource Management

- Operation Management
- 3D Dashboard
- Equipment & Device Management
- CPU-Based AI Framework Service
- AI Framework Service with GPU Resource Management



(3) All-in-one Nodes
SKY-7221



(3) Controller Nodes
SKY-8101

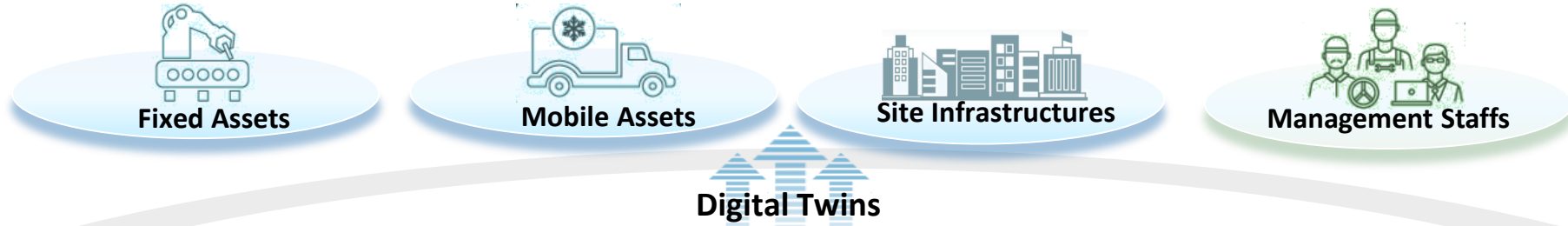


(3) HCI Nodes
SKY-7221



(1) AI Node
SKY-6400

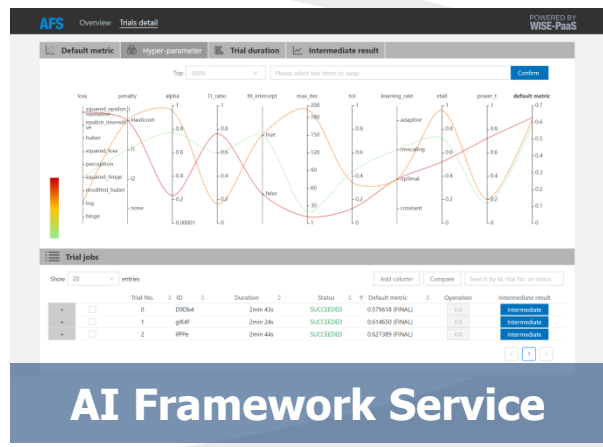
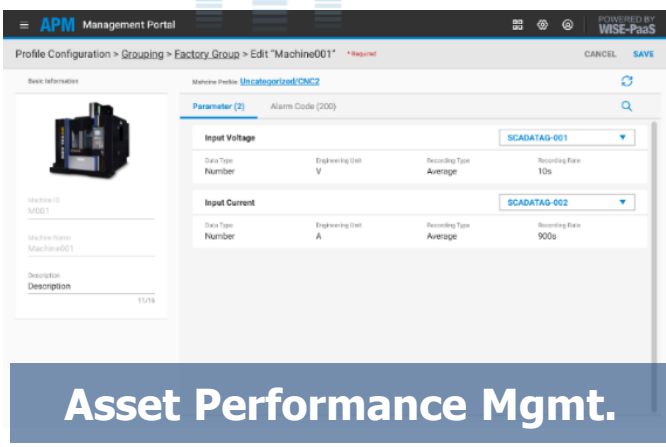
Interactivity through WISE-PaaS Application Framework Services



Integration with workflow IT systems

Connected Assets, Sites, & Staffs

Data Fusion



WISE-PaaS/Dashboard
WISE-PaaS/SaaS Composer

Multiple Data Sources
2D & 3D Rendering

WISE-PaaS/APM

Asset Models
Asset Evaluation
Workflow Integration

Alarm/Trigger
OTA
Auth. Mgmt.

WISE-PaaS/AFS

Code IDE
Hyper Parameter
Data Pre-Processing

Model Management
Inference Engine Deploy
Compute Resource Mgmt.

WISE-PaaS/EnSaaS Scalable Data Platform with Microservices Framework



Connected OT assets



Istio Knative Micro-services
kubernetes Container
openstack Hardware Resource Management
WISE-STACK Private Cloud
IaaS



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WISE-PaaS
IoT Edge Intelligence

Online Model Training
Inference Engine Remote Deployment
Model Remote Deployment
APM Asset Model Integration

WISE-PaaS/APM
Asset Performance Management

WISE-PaaS/EnSaaS
Industrial IoT Cloud Platform

WISE-PaaS/AFS
AI Framework Service for Models Training & Deployment

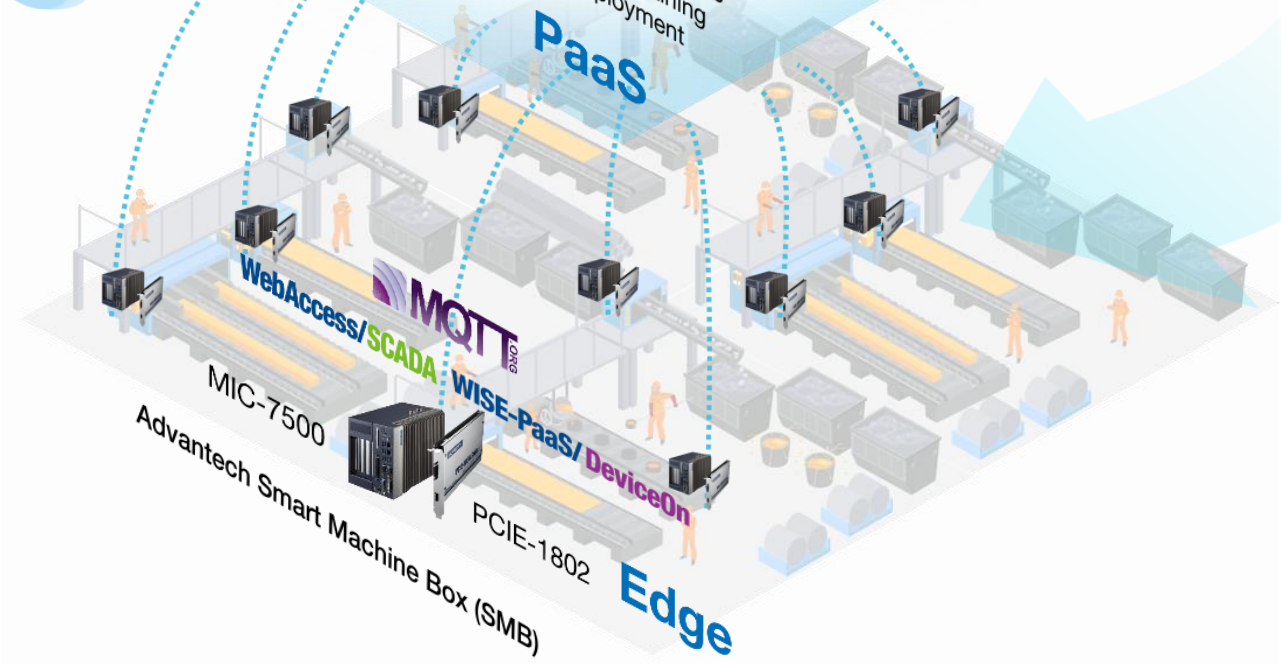
WISE-PaaS/Dashboard
Data Analysis & Visualization
WISE-PaaS/OTA
Over-the-Air Software Updates

Equipment Monitoring
Equipment Diagnosis
Preventive Maintenance
Alert Broadcasting
SaaS

RESTful APIs

PaaS

WebAccess/SCADA MQTT
MIC-7500
Advantech Smart Machine Box (SMB)
PCIE-1802
WISE-PaaS/DeviceOn
Edge



Advantech Network Solutions Differentiation

Business Model

- ODM/DMS
- Branding/OTS
- Local CTOS

Design Capability

- In- house (EE, ME, SW, BMC, Thermal..)
- Manufacture Sites
- Co-creation partners

Services

- Across 26 countries
- 4 Logistic Centers
- 14 Repair Centers

High Scalability

- Rich product portfolio
- ATOM/ Core i/ Xeon-E3/ E5
- Cloud, NFVi, Networking, Server and Video

Longevity & Revision Control

- 7 years longevity
- Key component control/ notify



Cloud-IoT Showcase

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WISE-STACK Private Cloud Solution

Fully Integrated Edge Intelligence Cloud

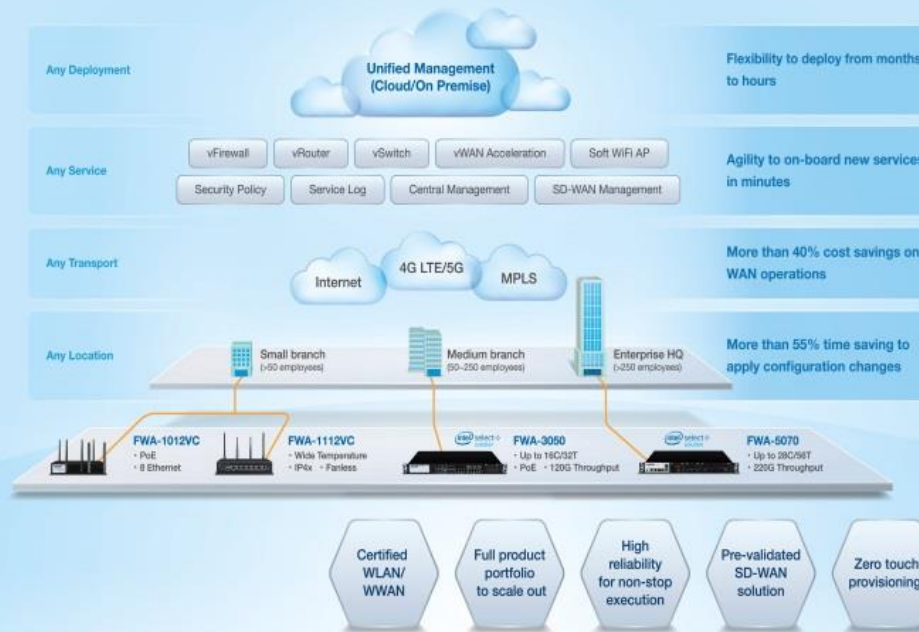
- Privacy
- Continuous Operation
- Multi-tenancy Support
- Easy Expansion
- Enable IoT Solution
- Cost Effective



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SD-WAN Transformation at Enterprise Edge

Accelerate 5G and IoT with Cloud Connectivity



ADVANTECH

SKY-8000 Servers for Private 5G Small Cell Mobile Networks

Compact Network-in-a-Box Ready to Deploy



Co-Creating the Future of the IoT World

