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One-Chip Flash Storage Solution for Industrial Applications

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Santa Clara, CA



Outline

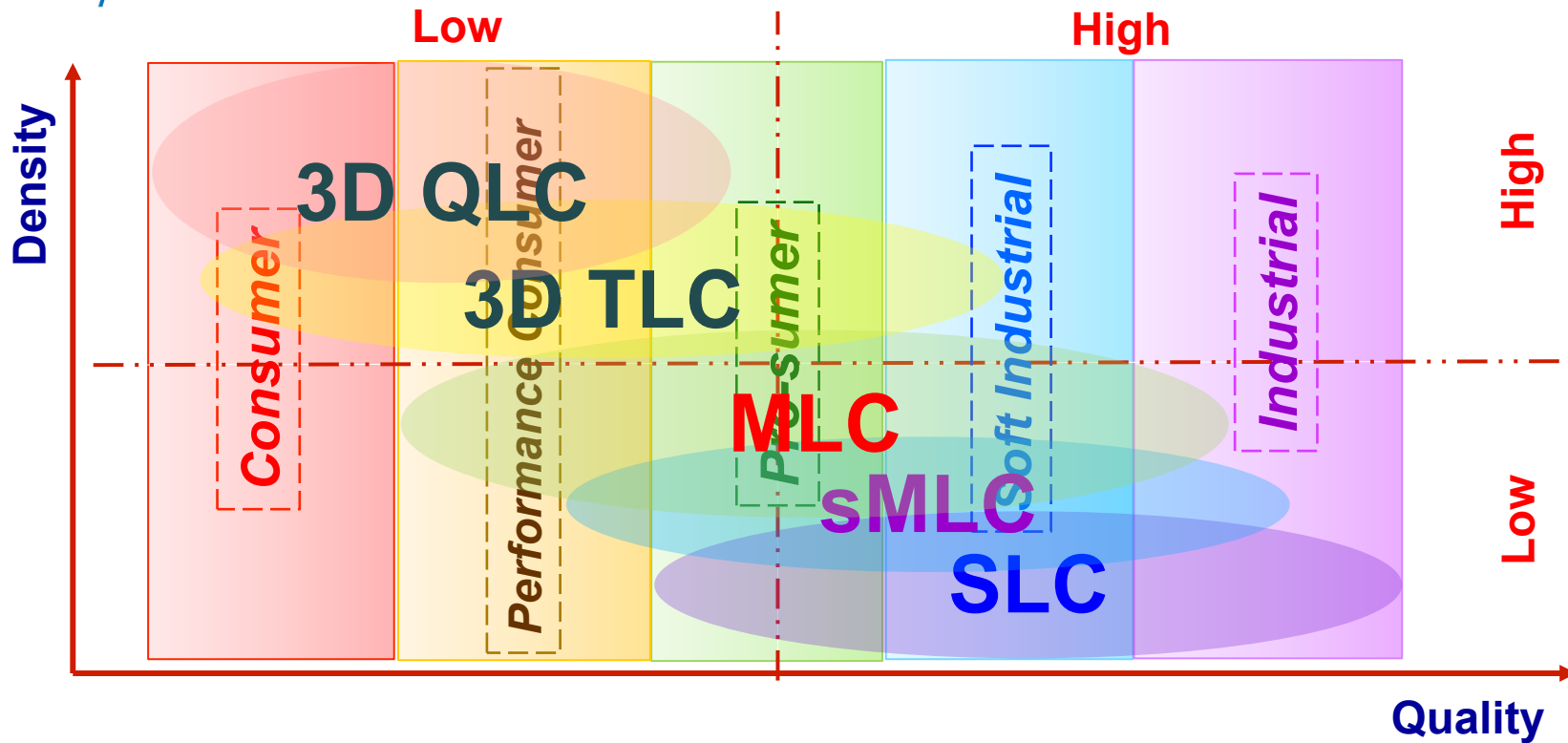


- Background: Industrial Applications
- Overview of One-Chip Flash Storage
- Industrial Embedded Systems & Applications
- One-Chip Flash Storage for Industrial Applications
- Application Examples
- Conclusions



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Market Segments for Flash Storage





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Industrial vs. Consumer



	<u>Industrial</u>	<u>Consumer</u>
Users	Enterprise/Group	Personal
Customize	YES	NO
Life Cycle	> 5~20 years	[1~5] years
Quality	High	Satisfactory
Longevity Supply	YES	NO
Design-In	Long-term	Timing, Cost
Applications	Specific	Common
Environment	Versatile, Severe	General

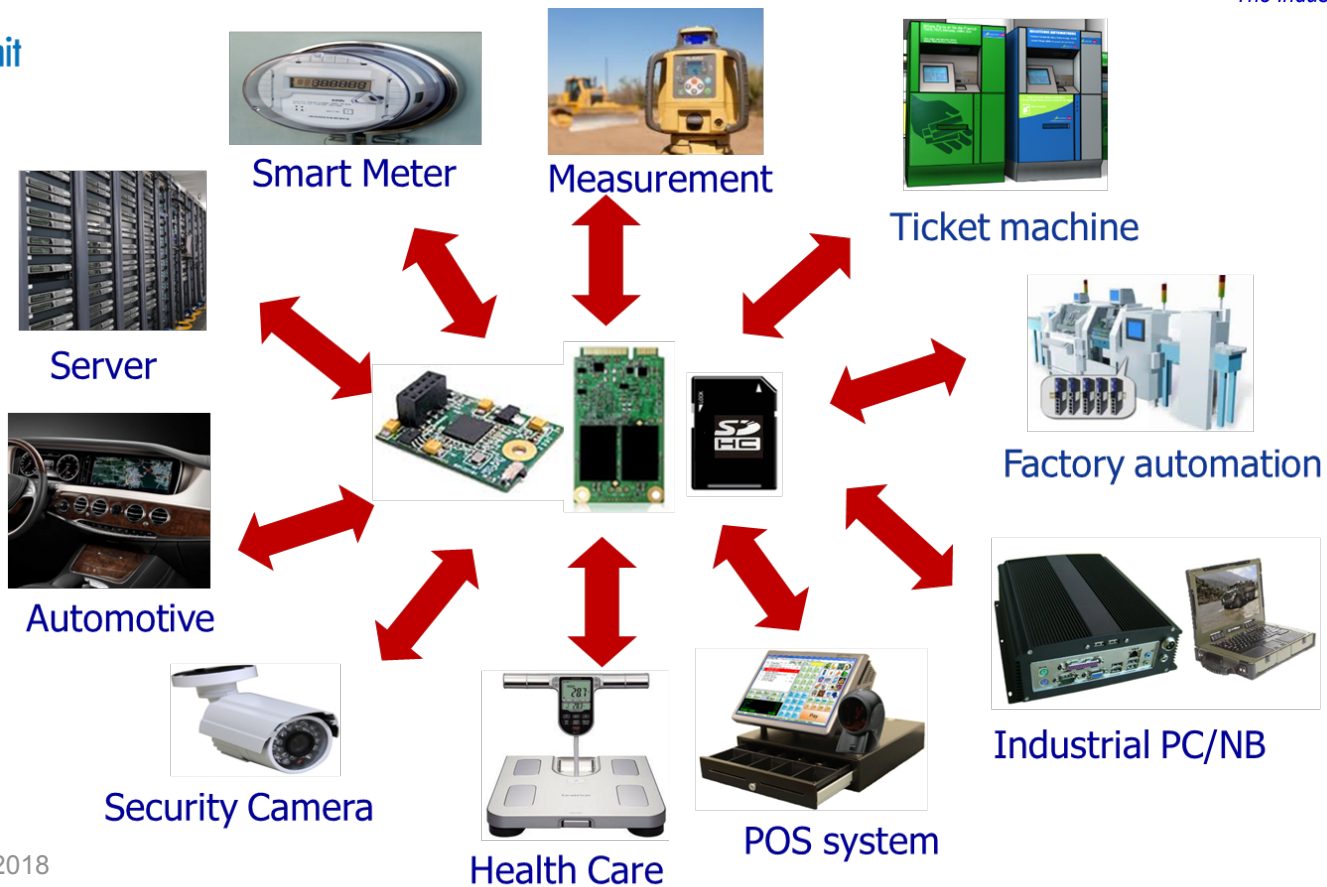
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Versatile Industrial Applications





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Versatile Embedded Flash Storage



The Industrial Flash Storage Expert.

Interface Types:

- SD:
- USB:
- PATA:
- **SATA:**
- eMMC:
- UFS:
- PCIe/NVMe:

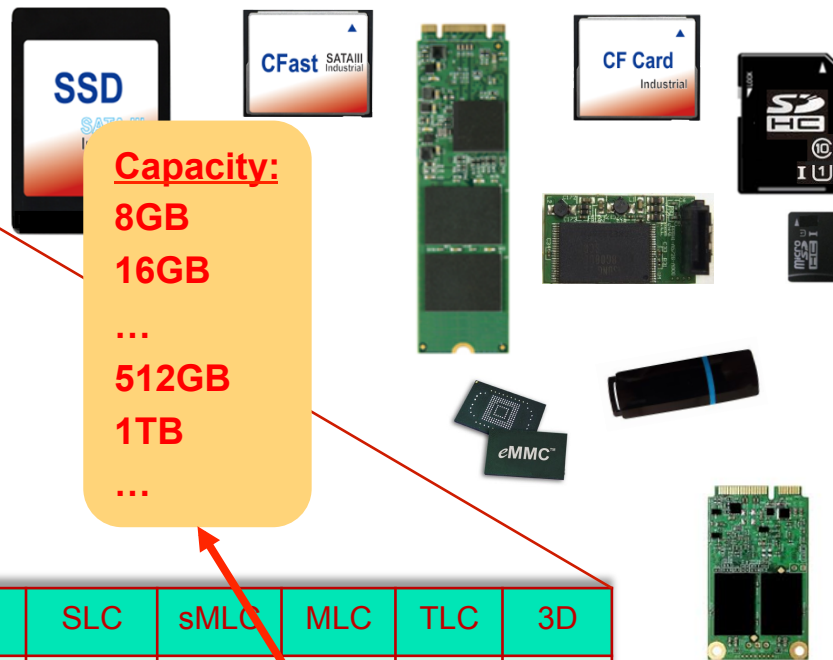
SATA Form-factor:

- 2.5" SSD:
- Half-slim:
- mSATA:
- M.2:
- U.2:
- DOM:
- CFast:

Capacity:

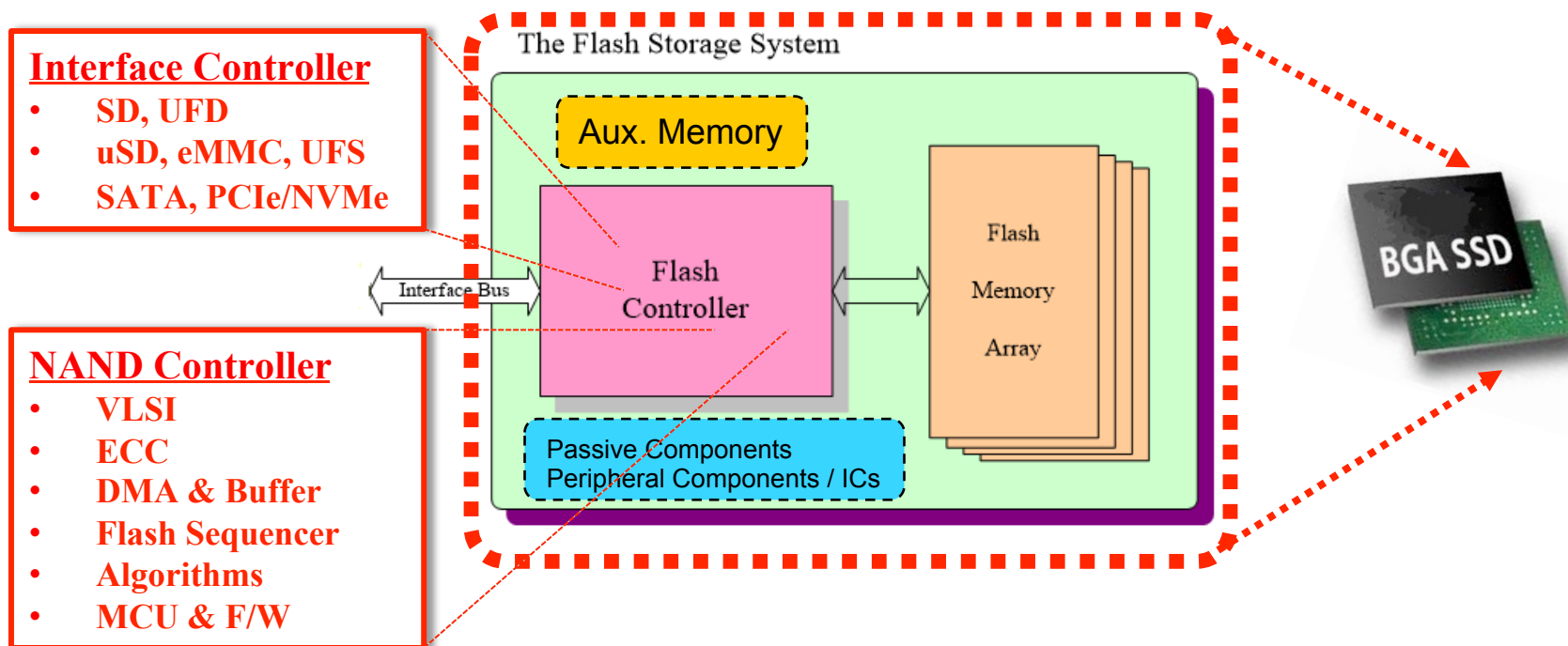
- 8GB
- 16GB
- ...
- 512GB
- 1TB
- ...

NAND Flash	SLC	sMLC	MLC	TLC	3D
WT (-40~85°C)					
ET (-25~85°C)					
CT (0~70°C)					





Concept of One-Chip Flash Storage





One-Chip Storage vs. Module

	One-Chip Storage	Module Storage
Size & Shape	Small, One Package.	Middle to Large, PCBA.
Density	Small	Small to Large
Water/Dust Proof	Strong	Weak
Anti-Vibration	Strong	Good
Heat Dissipation	Difficult	Simple
Repair & Maintenance	Need Special Care	By replacement
Role in whole system	Components	Sub-systems
Manufacturing	IC Packaging (SIP)	SMT



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Developing Technology Trend



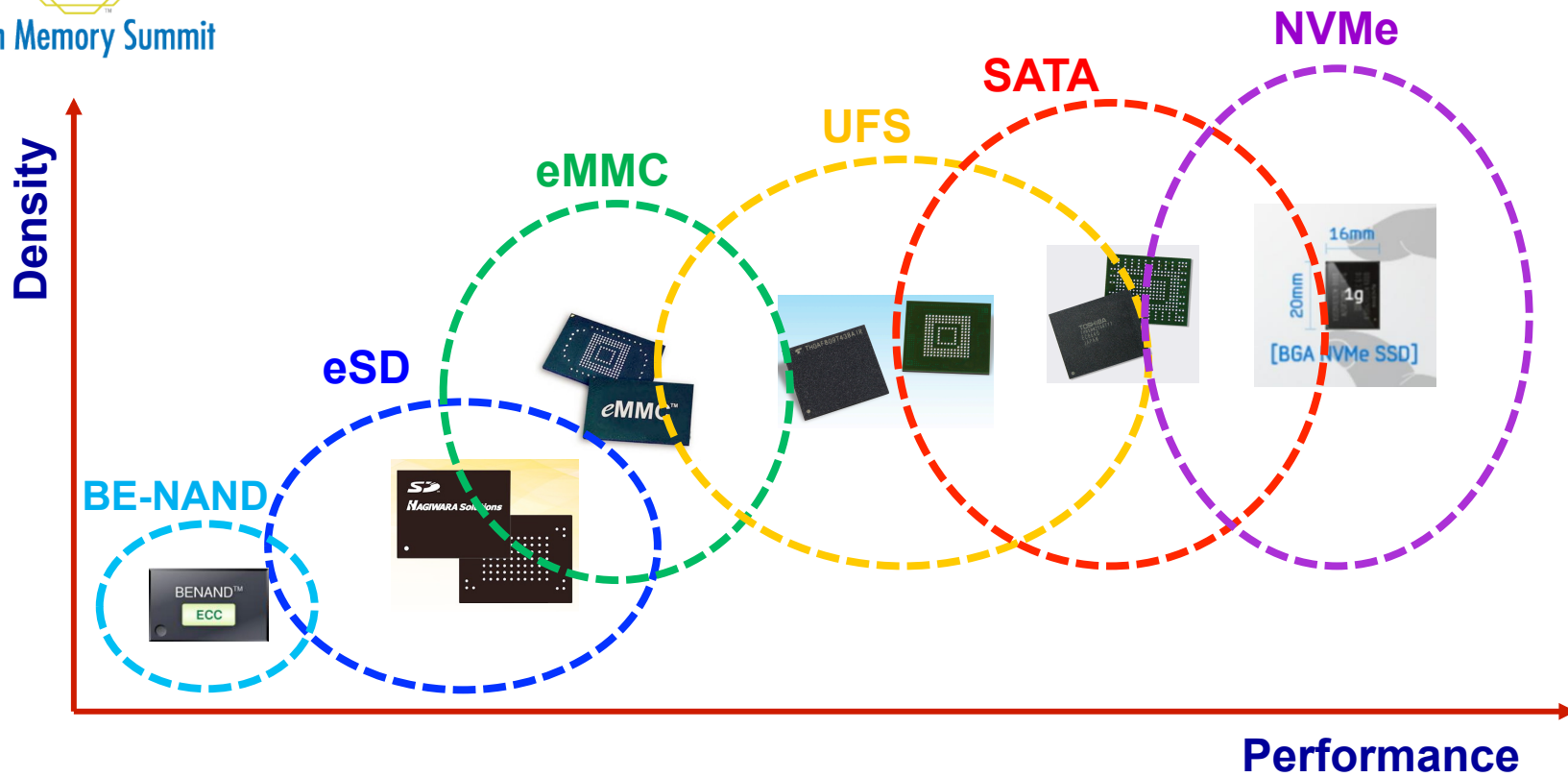
- **Innovative Technology to:**
 - Refine and improve the performance.
 - Integrate the functions.
 - Reduce the physical size.
 - Simplify and shrink the components.
 - Form the solid and compact package.
- **Standardized Manufacturing to:**
 - Increase operation efficiency.
 - Provide high quality and reliability.
 - Reduce the cost.
 - Shorten delivery cycle.





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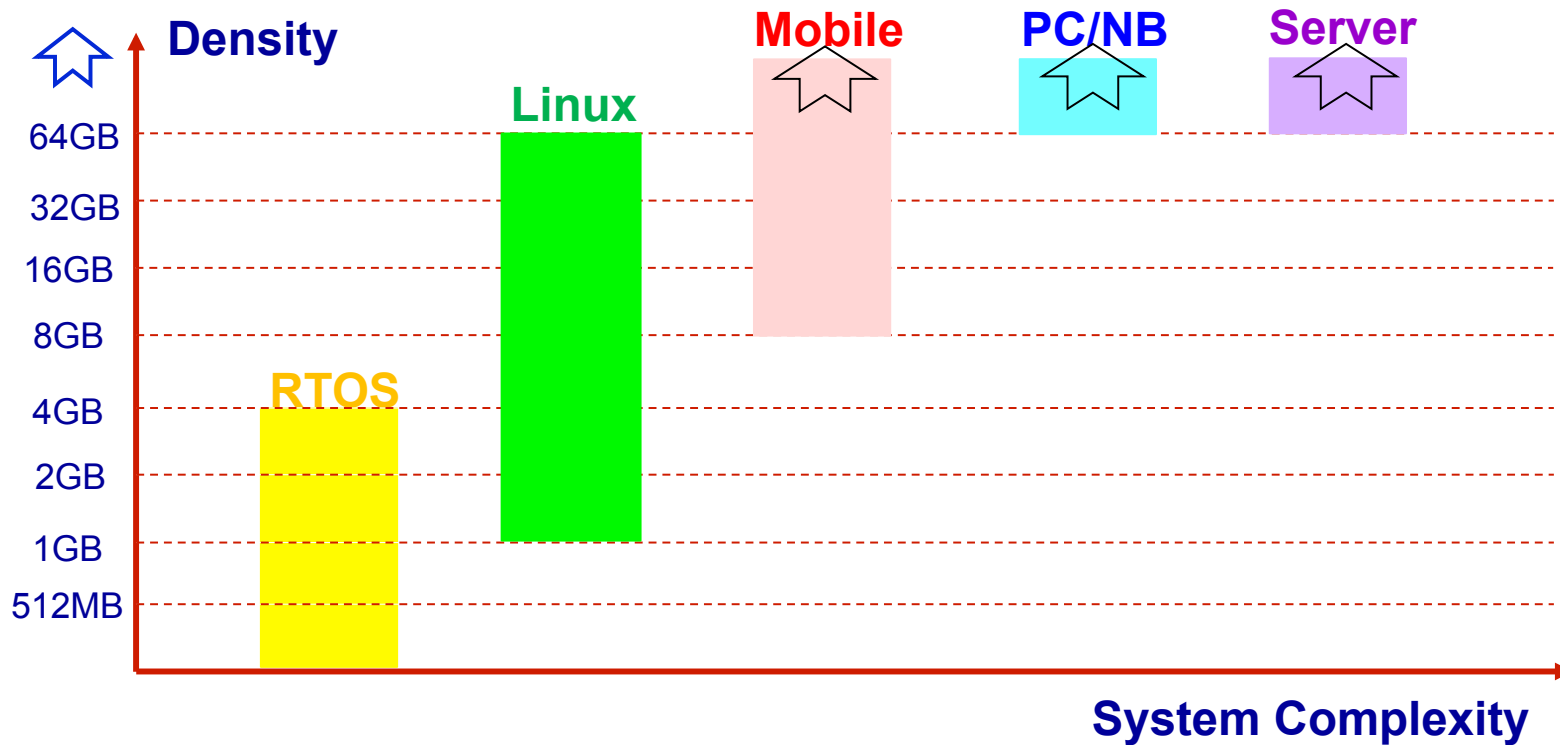
One-Chip Flash Storage Devices





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Flash Storage in Embedded Systems





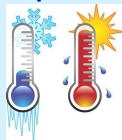
Industrial One-Chip vs. Standard

	Industrial One-Chip	Standard One-Chip
Applications	Industrial, Niche, Specific.	Commodity, High Volume.
Flash Memory	High Quality, Versatile. EX: SLC, sMLC, MLC,...	Standard, Main stream. EX: MLC, 3D NAND,
Package	Quality, Reliability.	Standard
Design Flexibility	SDK for Developers	Standard and no option
Wide Temperature	Support	No
Security Features	Support	No
Longevity	Support	No
Customization	Support	No



Application Environment

Temperature



Moisture



Dust

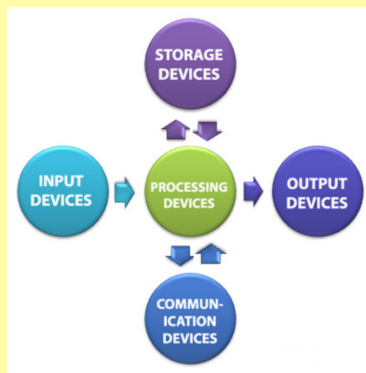


Data Security

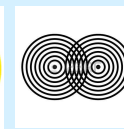


Embedded System

- Hardware
- RTOS
- Software
- User Interface
- Input Devices
- Output Devices
- Storage
- Communication



EMI & ESD



Workload



Shock & Vibration



Performance



Power





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Industrial Embedded Applications



- **Industrial:** Equipment, Instrument, Factory Automation, etc.



- **Aerospace:** Aircraft, Defense, Communication, etc.





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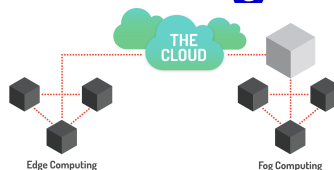
Industrial Embedded Applications



- **Automotive:** motor control, cruise control, body safety, engine safety, car infotainment, Autonomous Driving, etc.



- **Server and Networking:** IIoT, Edge computing, etc.



- **Security:** Surveillance, Healthcare, Medical, Banking.





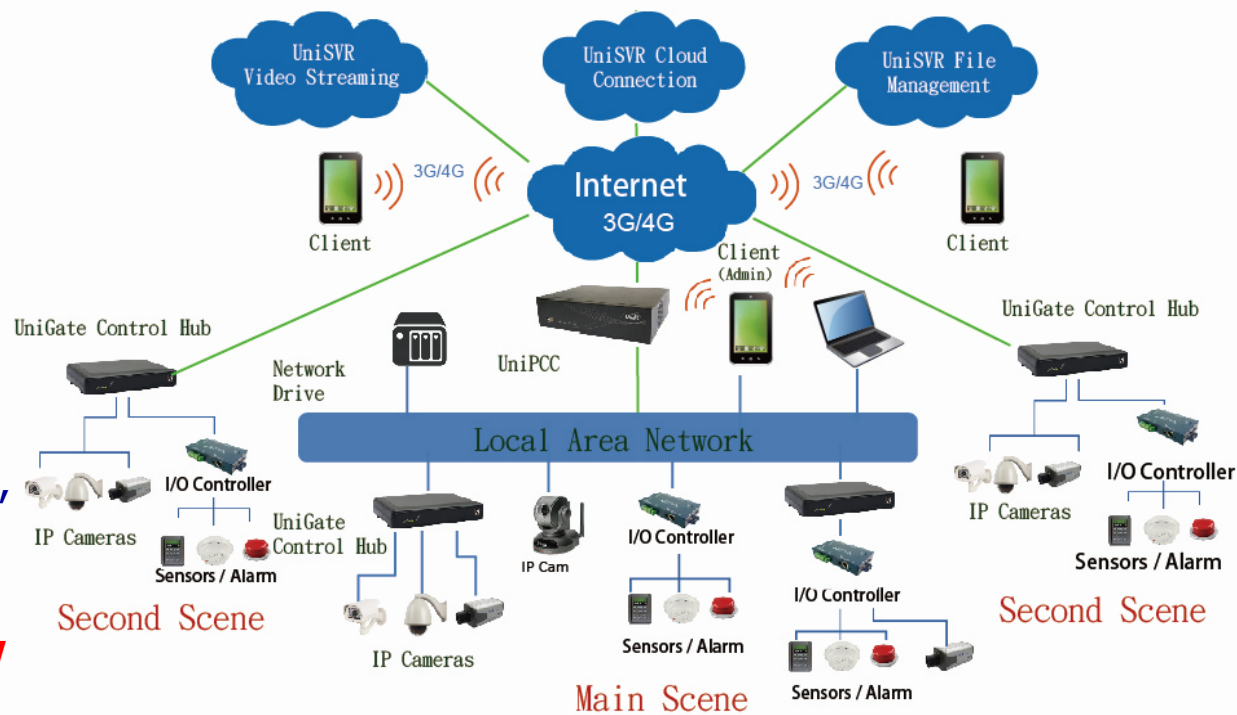
EFS in Industrial IoT Applications



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Embedded Flash Storage:

- For the "Things": Sensors, Actuators, IP Cams, I/O Controllers. (**Low density**)
- For the Gateway: Controller Hub, Network Gateway. (**Mid Density**)
- For the Server: the Cloud, Data Center. (**Large/ Super Density**)
- Data Logger for All: (**Low Density**)

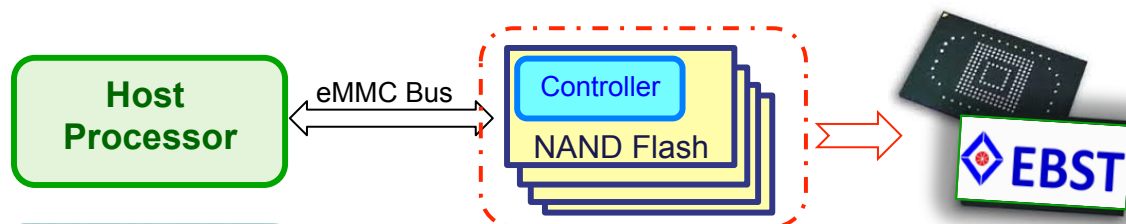


Source: UNISVR



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Industrial One-Chip Flash Storage



Design

- Complete Solution, Full Integration.
- World-Class Solutions with System Expertise

Quality

- Industrial Temperature Range: -40C to 85C
- High Endurance

Life Cycle

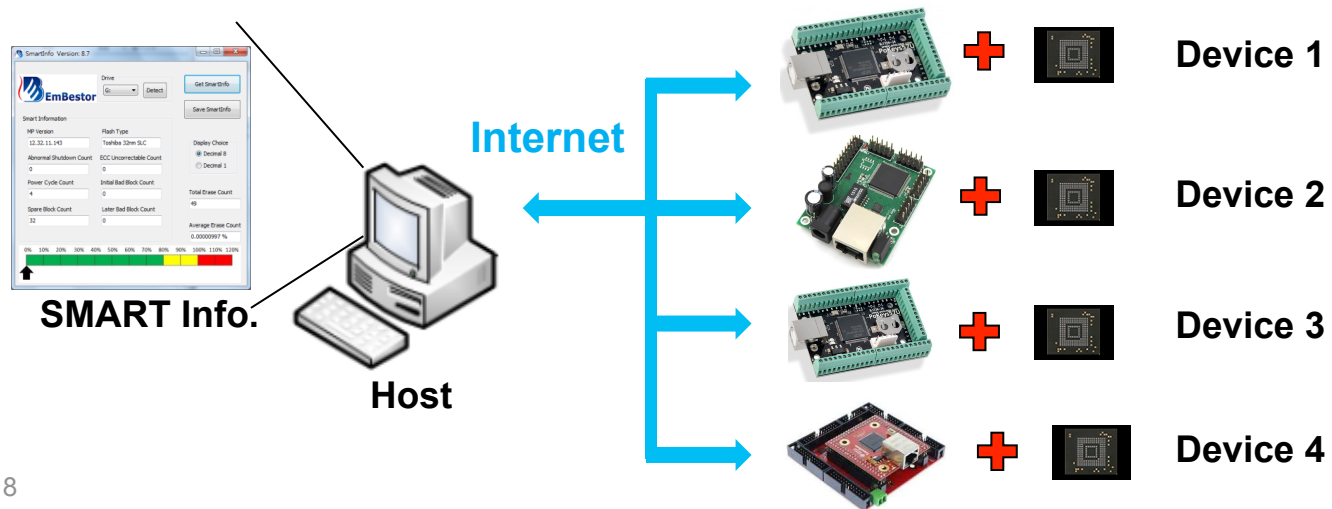
- Extended Life Cycles with BOM Control
- Product Change Notification (PCN)

Support

- FAE and Customer Quality Support
- Qualification and Failure Analysis Reports

Real-time Remote S.M.A.R.T.

- Host can get more of device's SMART Information easily.
- Support Customized Windows AP, the normal reader could get the SMART Info.
- Support SDK for several Linux OS versions





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EX: Camera/Sensor Module in IIoT



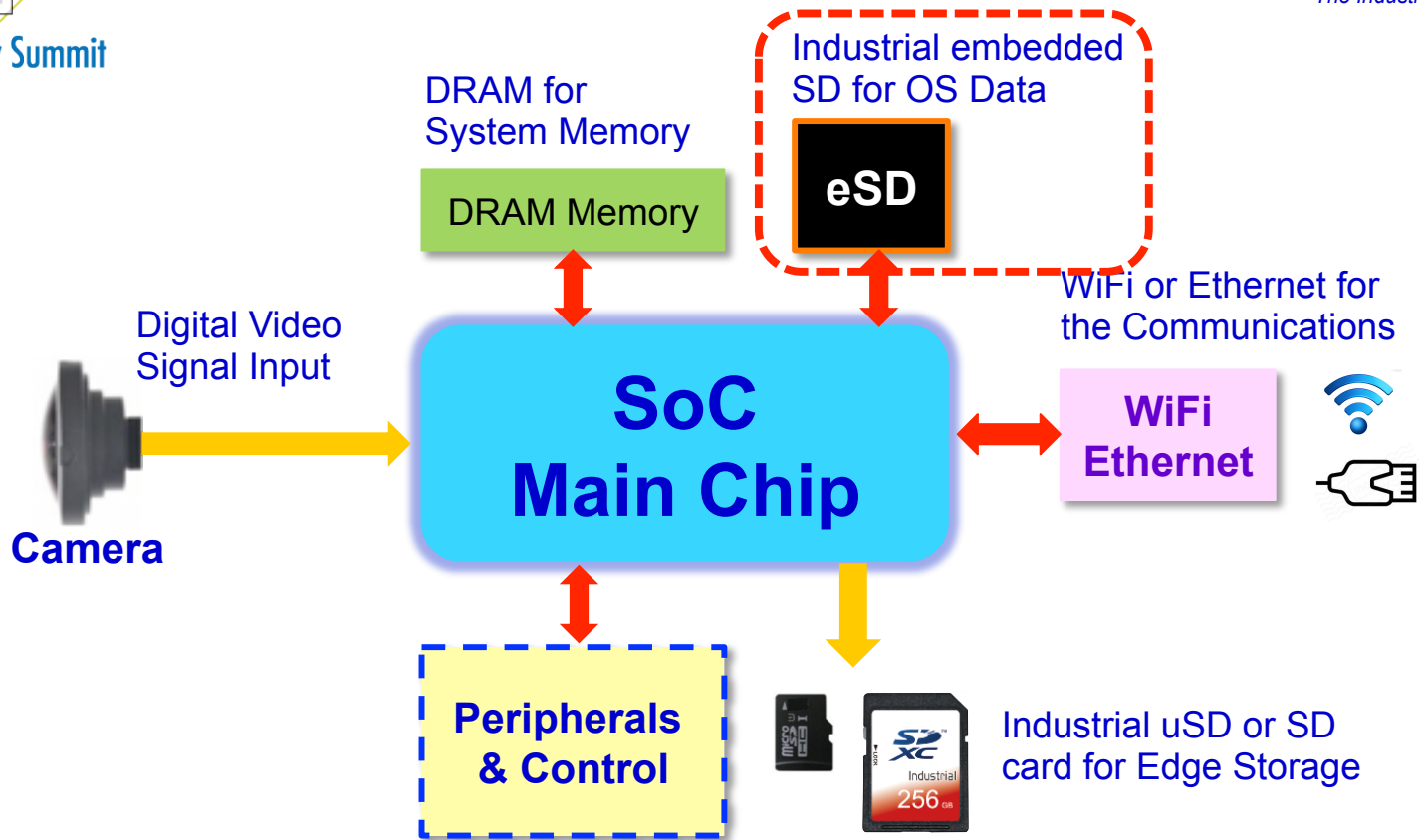
- **Smart Security Camera Module:**
 - Smart Security Camera with 365 24/7 video recording.
 - With Remote Monitoring & Control function.
 - With Video & Image Data Privacy function.
 - With Edge Storage and Data Analysis.

- **Smart Integrated Sensor Module:**
 - Smart Integrated Sensor for the environment sensing signals/data.
 - With Remote Monitoring & Control function.
 - With Remote Real-time S.M.A.R.T. feature.
 - With Privacy Data security.



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Smart Security Camera Module



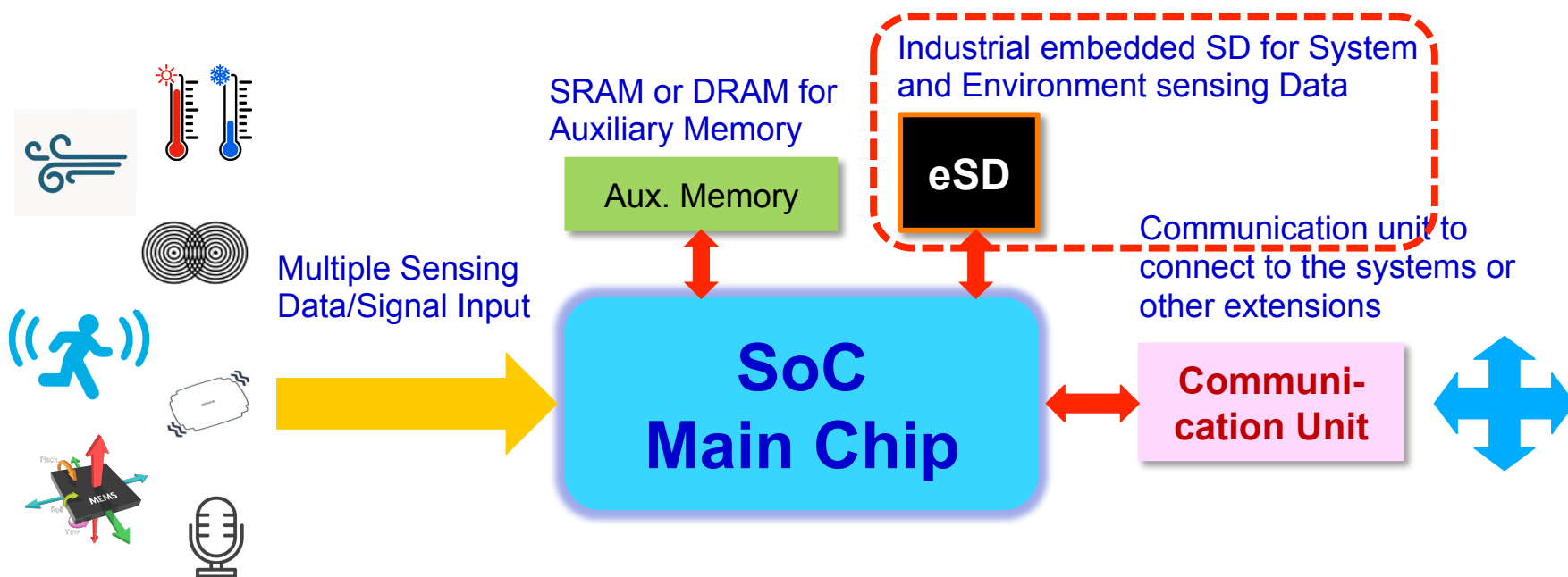


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Smart Integrated Sensor Module



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Conclusions



- One-Chip Flash Storage provides the small-size, neat, simple, compact, reliable solution for embedded systems.
- One-Chip Flash Storage will become more popular according to the developing trend of technology improving and innovations.
- Modularized hardware with relative standardized features is suitable for One-Chip Flash Storage.
- For industrial applications, One-chip Flash Storage needs to meet each application requirements in the versatile industrial embedded systems.



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Thank You !!

Enjoy Best Service !!

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