

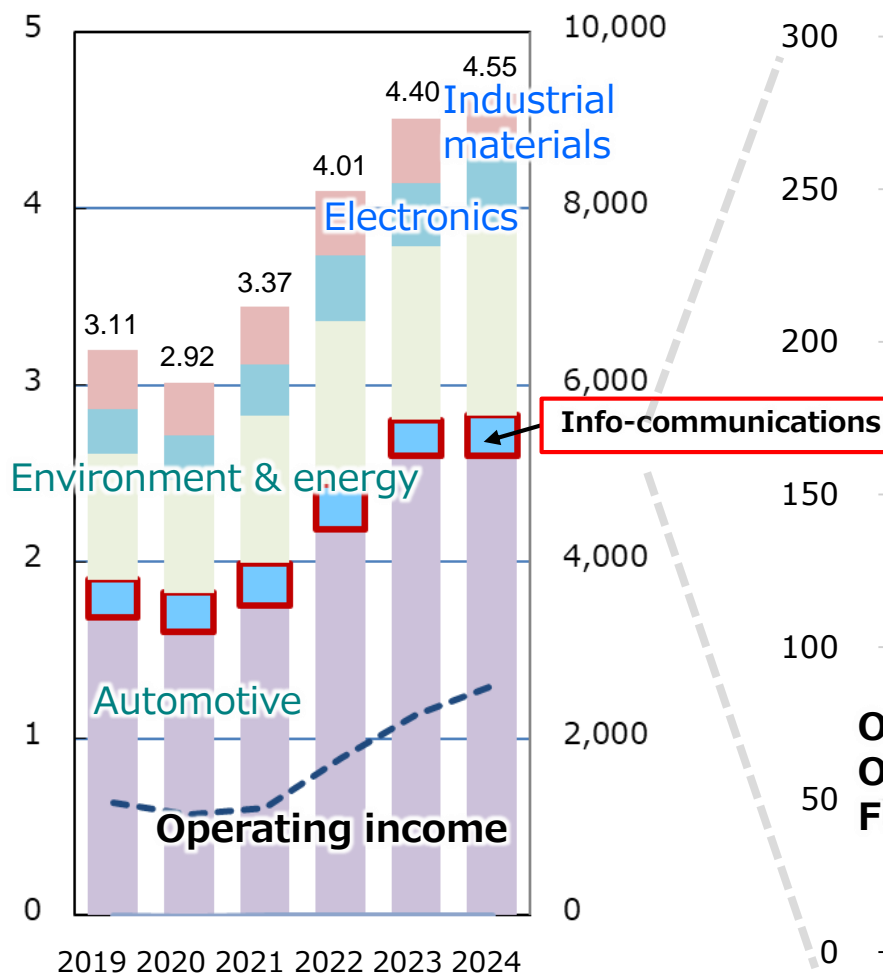
# **[Info-communications] Growth strategy for data center-related business**

Sumitomo Electric Industries, Ltd.  
November 13, 2024

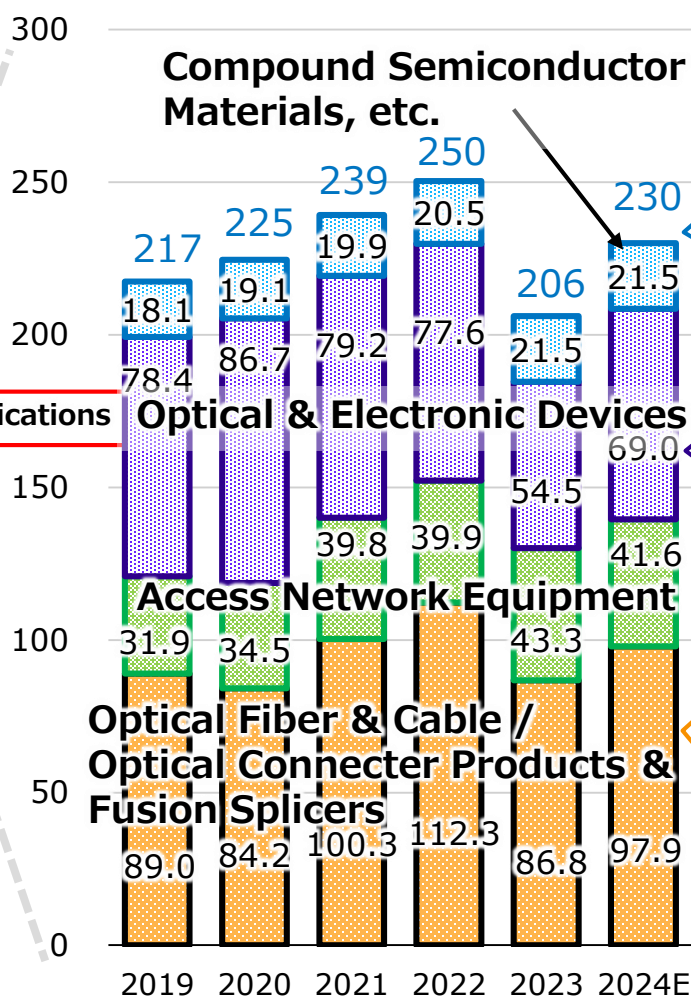
# Sales by Business Segment

Sales  
1 trillion yen/year

Operating income  
100 million yen/year



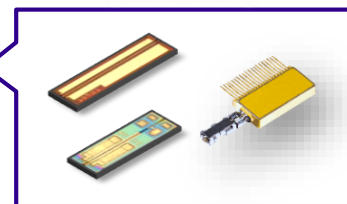
Sales  
1 billion yen/year



Data Center related products



Compound semiconductor substrate (GaAs, InP)



Optical Devices

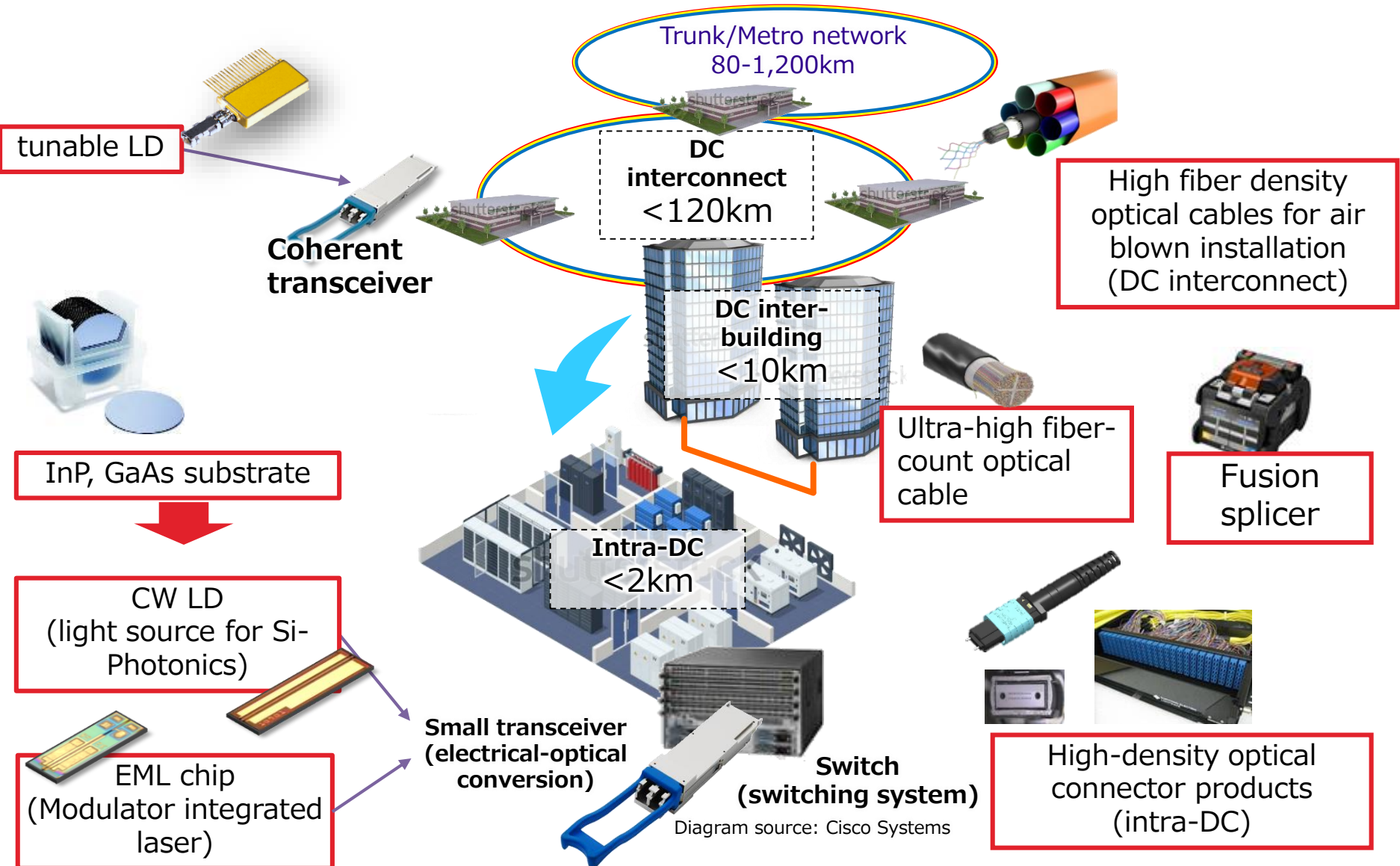


Optical fiber, cables, Optical connector, Fusion splicer

(E)

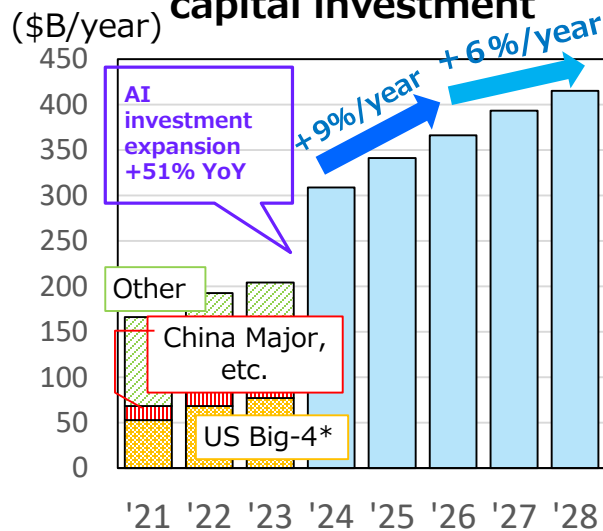
Source : FACT BOOK FY2024 1st Half Result  
<https://sumitomelectric.com/ir/library>

# Sumitomo Electric Products in the Data Center (DC) Market



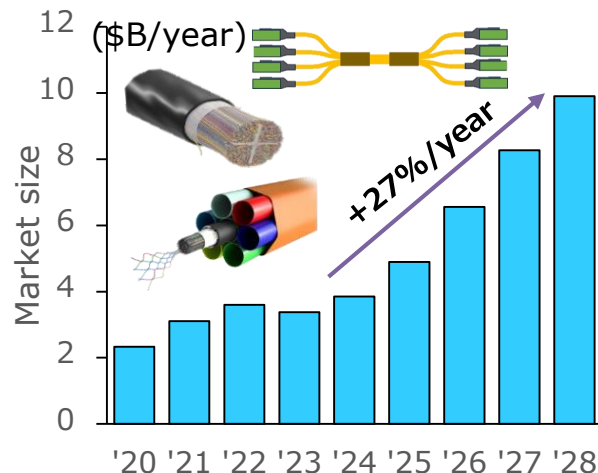
**DC operators making advanced investment in Generative AI market to secure long-term shares**

## DC IT infrastructure capital investment



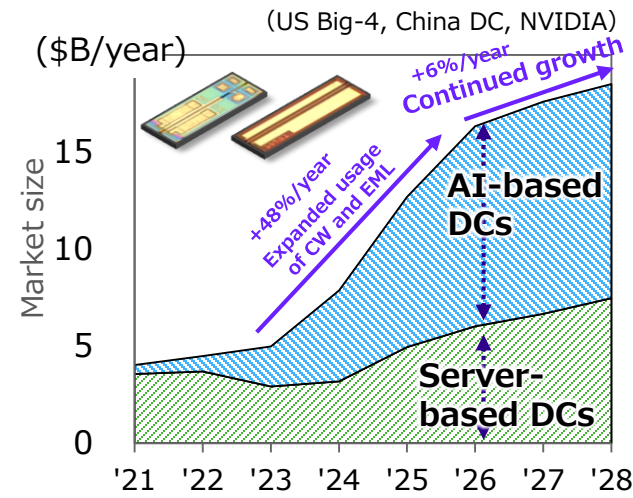
(US Big-4\*: Google, Amazon, Meta, Microsoft)  
 (China Major: Baidu, ByteDance Alibaba, Tencent)  
 Source : Omdia

## Optical connector and cable market for DCs



Source : Sumitomo Electric estimates

## Optical transceiver market for large DCs

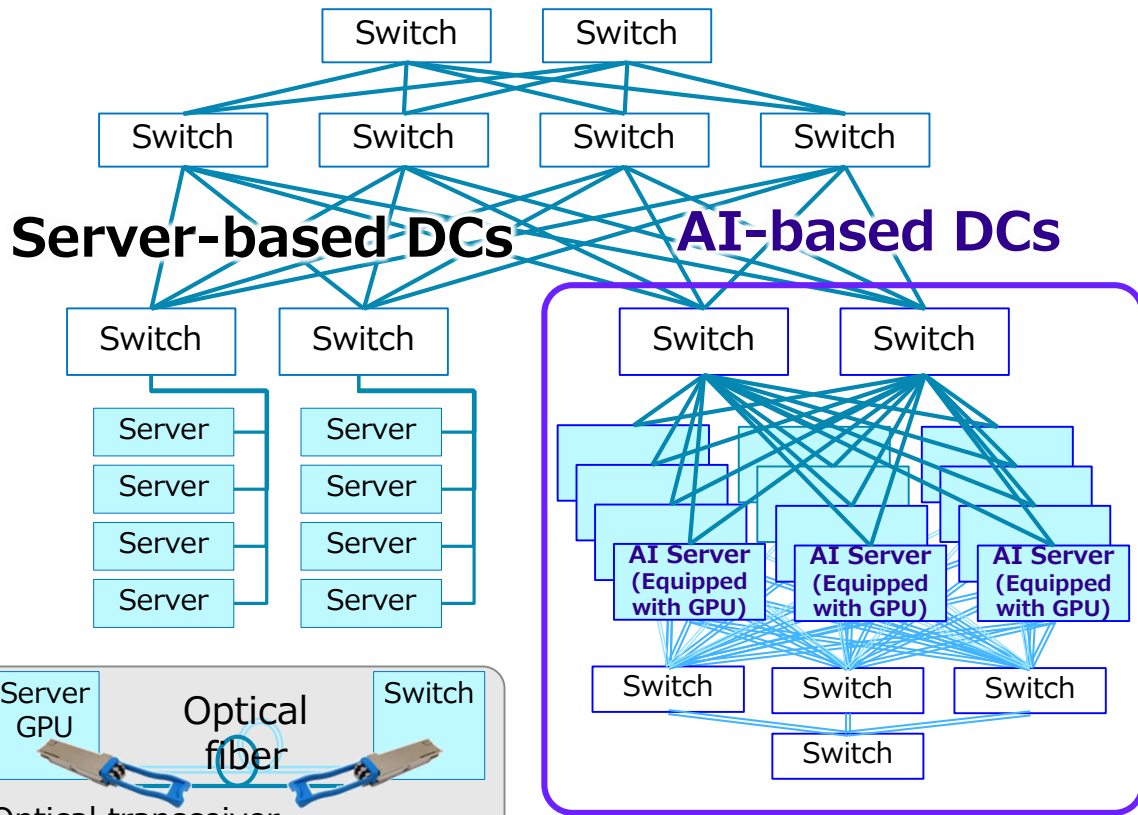


Source: Light Counting Cloud Datacenter Optics, Jul.2024

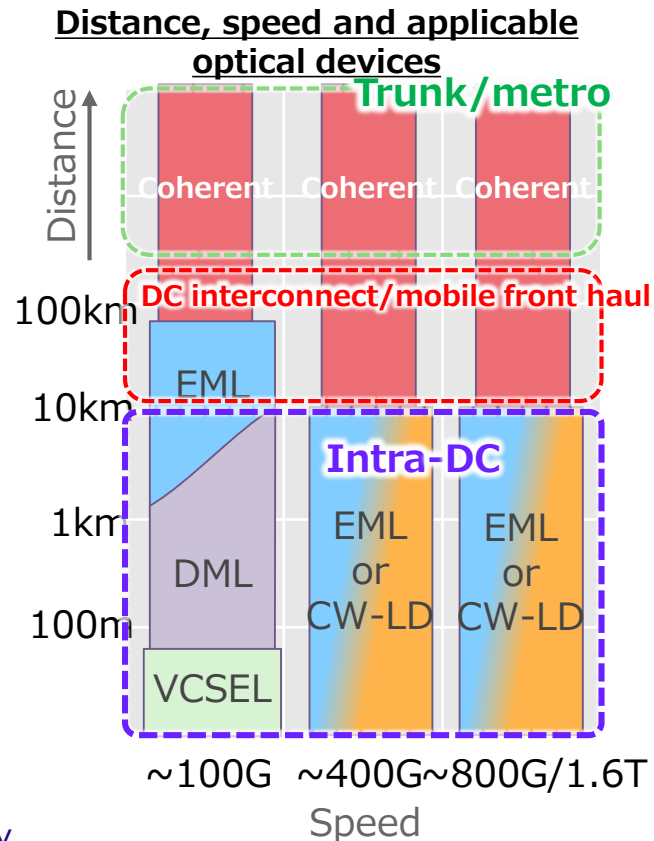
Market	North American and European DCs	Chinese DCs
Conditions	<ul style="list-style-type: none"> <li>• Increased investment in generative AI</li> <li>• Platformers (US Big-4, etc.) vying for supremacy</li> </ul>	<ul style="list-style-type: none"> <li>• Increased activity in domestic GPU development and imports</li> <li>• Increased DC construction by platformers (e.g. Chinese giants), although on a smaller scale</li> </ul>

# Architecture of DC for Generative AI and Optical Network

Since the advent of generative AI, the number of AI-based DCs for machine learning with multiple GPUs has increased. Optical network demand for inter-GPU has increased. Devices for optical networks change as speeds increase.





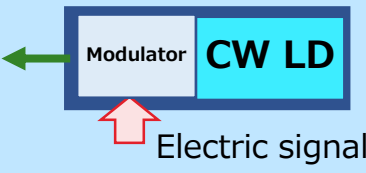
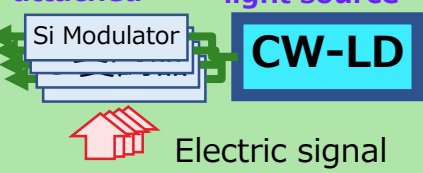
Tens of thousands of GPUs are connected by high-speed optical network (the DC for inference can be downsized according to the application)



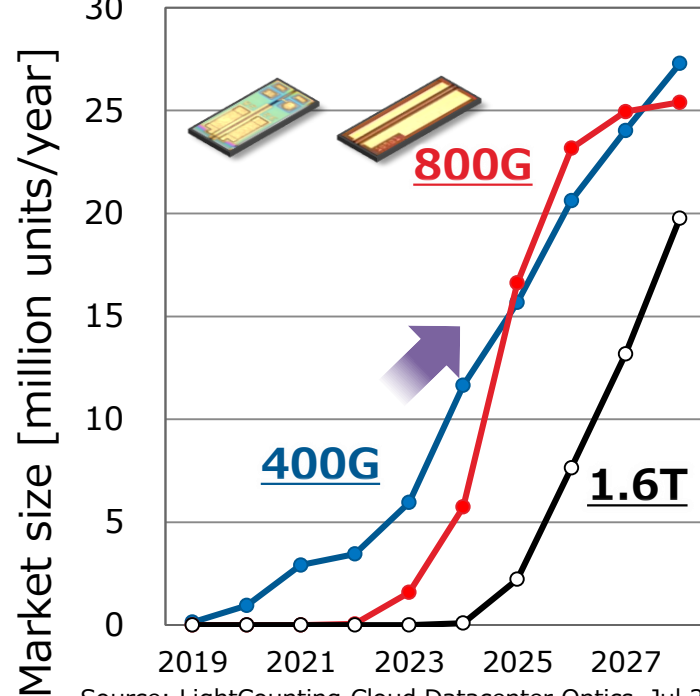
VCSEL: Vertical cavity surface emitting laser  
 DML: Direct modulation laser  
**EML: Electroabsorption-modulated laser**  
**CW: Constant wave (used in conjunction with Si modulator)**  
 Coherent: Long-distance transmission technology

# Optical Devices Used for Intra-DC

Optical devices used for the optical network of intra-DC are mainly EML and CW-LD, which are our main products.

	EML 	CW-LD 
Composition	<p style="color: #00AEEF;">Modulator integrated</p> 	<p>Externally attached High-output light source</p> 
	Operates on its own chip	Consists of a light source and a Si modulator
Conditions	Currently mainstream	Outlook for future growth
Sumitomo Electric Features	Compact design Cost-competitiveness and high production capacity with 4-inch mass production technology	Highest output in the market Cost-competitiveness and high production capacity with 4-inch mass production technology

Optical transceiver market for use for intra-DC

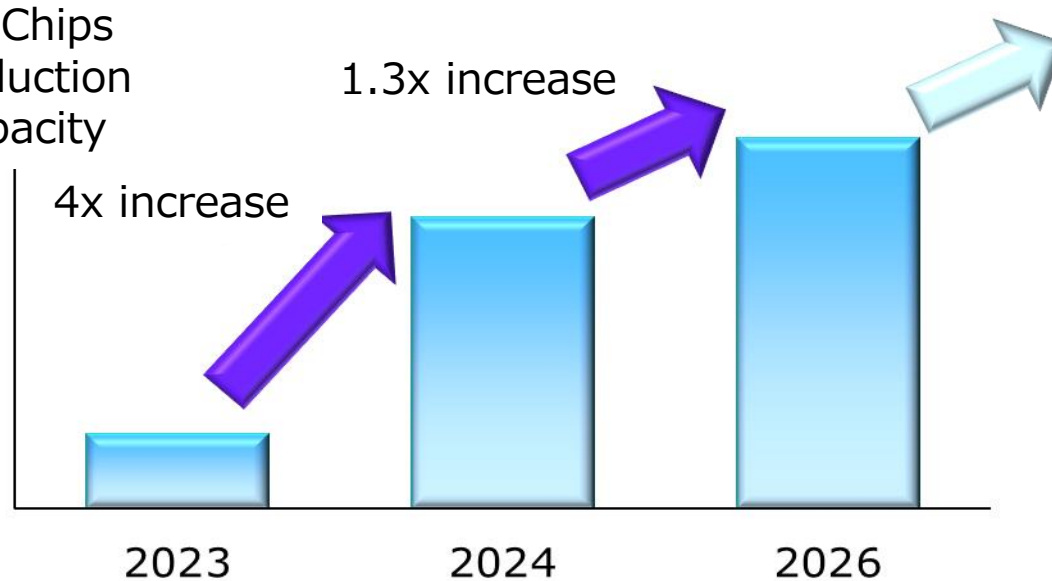


Demand ratio for chip quantity (Sumitomo Electric estimates)

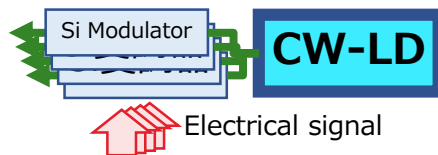
Chip	2024	2026	2028
EML	76%	55%	31%
CW-LD	24%	45%	69%

# Plans of Production Capacity Expansion and New Product Launch for intra-DC optical devices

LD Chips  
production  
capacity



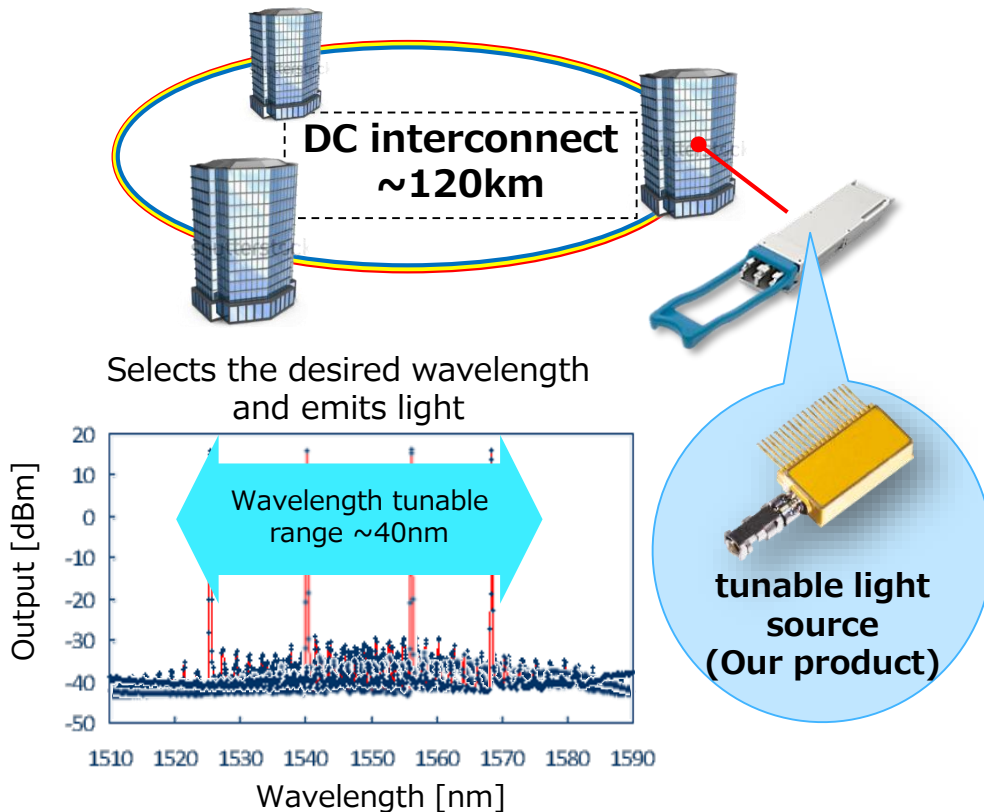
CY	2023	2024	2025	2026	2027	
EML	EML for 400G/800G (100G/1 wavelength) (4.5dBm(2.8mW))		Market launch	EML for 800G/1.6T (200G/1 wavelength)		
CW-LD		100mW class CW-LD		Market launch	350mW class CW-LD	



Support for high-density and parallel Si photonics modulators for 1.6T OSFP (transceiver) and CPO (Co-Packaged Optics).

# Optical devices used for DC interconnect

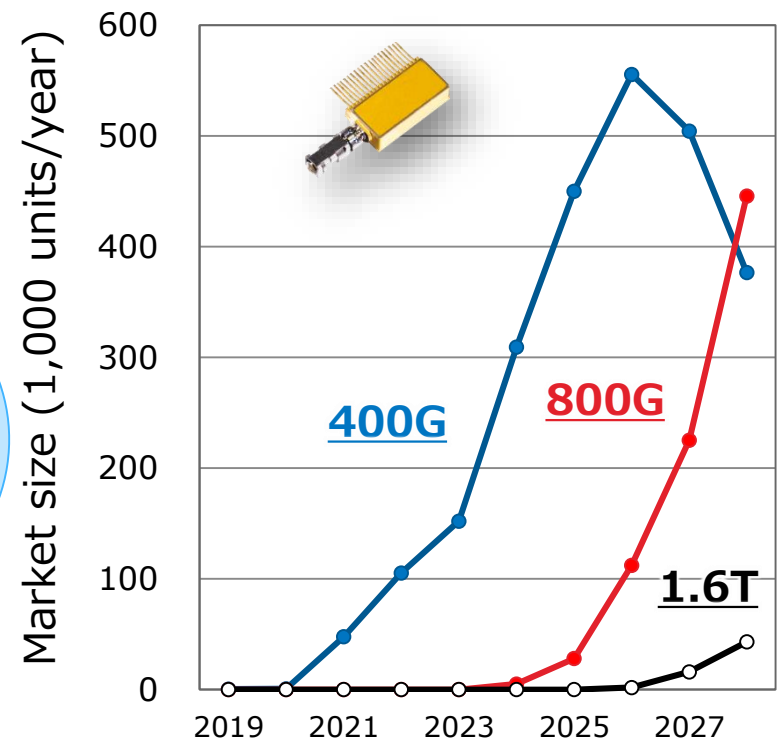
Decentralizing DCs in terms of power procurement and site availability requires DC interconnect using wavelength-multiplexed coherent technology with wavelength-tunable LDs.



Selects the desired wavelength and emits light

**Features of Sumitomo Electric's product:**  
**High output, low power consumption**  
**Supports the 19dBm (90mW) required for 800G**  
**Highest output in the industry**

## Optical Transceiver for DC interconnect Market



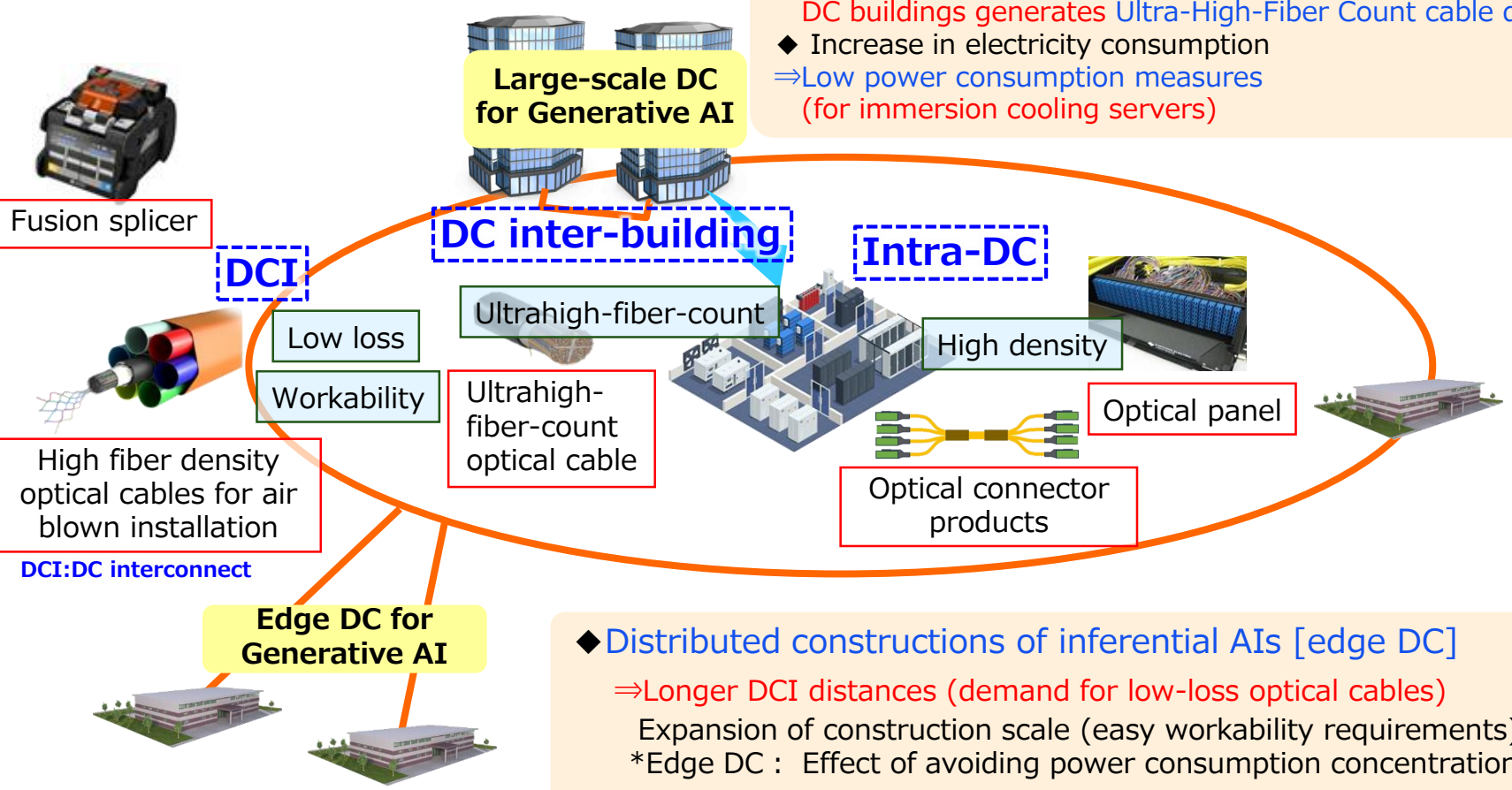
Source: LightCounting Cloud Datacenter Optics, Jul.2024



# The relationship between DC for Generative AI and the demand for optical fiber-related products

## Changes in demand due to DC for Generative AI

- ◆ Massive learning  
→ tens of thousands of GPUs interconnected by optical network
  - Optical connector demand is 7 to 10 times that of conventional DCs
- ⇒ Compact, lightweight, high-density, low-loss
  - The increase needs of more optical network inside and between DC buildings generates Ultra-High-Fiber Count cable demand
- ◆ Increase in electricity consumption  
⇒ Low power consumption measures (for immersion cooling servers)



- ◆ Distributed constructions of inferential AIs [edge DC]
  - ⇒ Longer DCI distances (demand for low-loss optical cables)
  - Expansion of construction scale (easy workability requirements)
  - \*Edge DC : Effect of avoiding power consumption concentration

# Our Strengths and Main Optical Fiber-related Products

- **Vertical integration** e.g. from connector parts to assembly products  
⇒ High performance, high reliability
- **Product development and customization capabilities** that bring together in-house technologies, including materials  
⇒ **Rated No. 1 for four consecutive years by existing major customers**



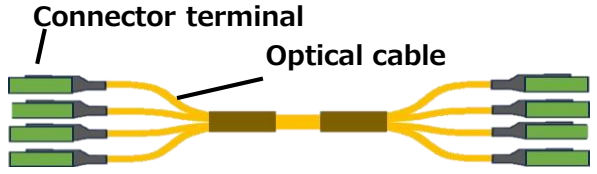
**Further growth through expansion of customer base**  
**Our customer base growth: 4 times increase from FY23 to FY25**

## Optical connector products

- High-speed optical communication links the GPU, switches and servers inside the DC

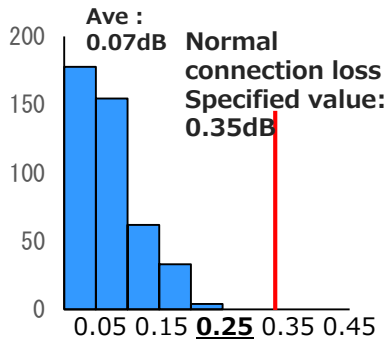


Connector terminal (ferrule) cross-section



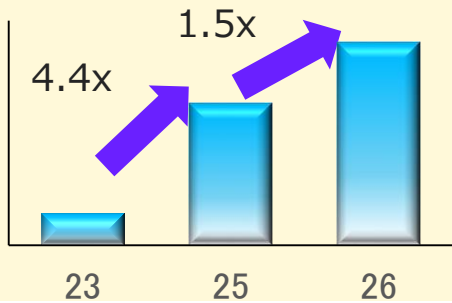
High-precision connector terminal processing technology + High-precision optical fiber, integrated manufacturing

**Low loss of 0.25dB or less is achieved, compared to the usual 0.35dB loss with high-density 24-core MPO connectors**



Loss measurement data for our 24-fiber MPO connector

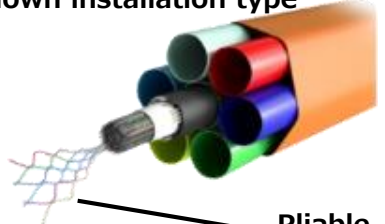
### Optical connector production capacity



## Optical cables

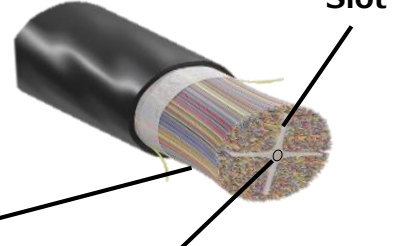
- **Pliable Freeform ribbon™ fiber with excellent fusion splicing workability, low-loss fiber application**
- Development of 3456-fiber and 6912-fiber cables **before anyone else in the world**

① High-density air blown installation type



Pliable Freeform Ribbon™

② Small diameter 6912-fiber-count robust cable (outer diameter: 32 mm)



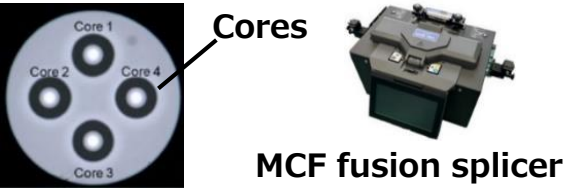
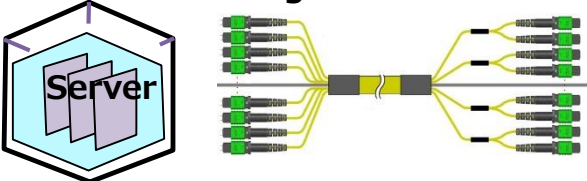
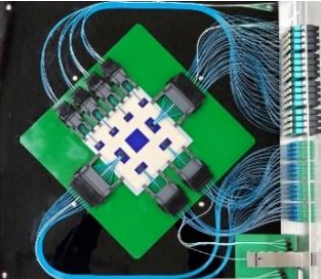
Center tension member (TM) ⇒ **No bending directionality**

- ① High fiber-count / high-density cable (air blown installation, pre-terminated, high installation performance)  
+ [Customization according to needs]
- Currently developing the world's top-performing air blown installation
- ② **Unique slot and center TM structure** => Optimal for DC conduit installation
- High-precision slot molding fiber stranding technology achieves both **flexibility and robustness, achieving no installation accident ever** (caused by the product)

# Future optical fiber-related products

## [Total technical strength within the company]

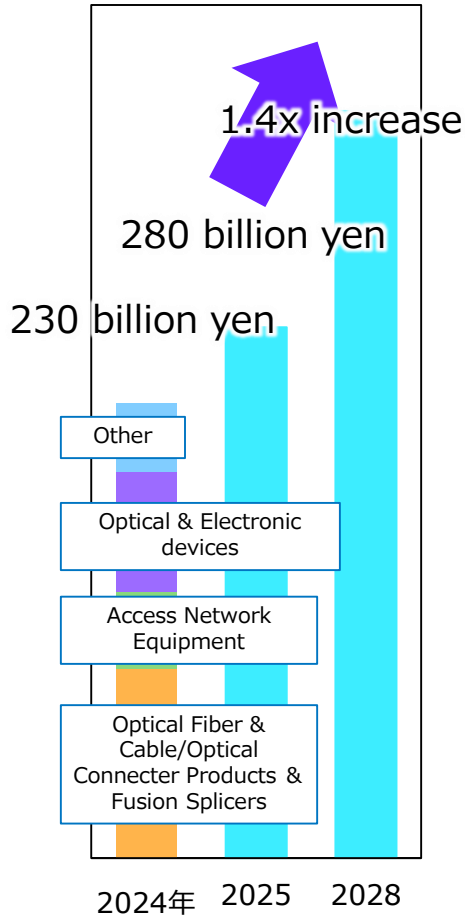
In addition to optical fibers and connectors, we also offer a wide range of technologies, including optical devices and electronic wires. We are able to respond to the diversification of needs in generative AI.

Product	Features and Strengths
<p><b>Multi-core fiber (MCF) (fiber with multiple cores)</b></p>  <p>MCF fusion splicer</p>	<ul style="list-style-type: none"><li>• Great expectations for a product that achieves higher density and more efficient construction</li><li>• First in the world to be introduced commercially for use for submarine optical cable, outpacing other companies</li><li>• Providing solutions in combination with specialized fusion splicers and peripheral technologies</li><li>• Rapid expansion expected for DC (ultra-high density solution)</li></ul>
<p><b>Optical connector products for immersion cooling servers</b></p>  <p>Conceptual design of an immersion cooling server</p>	<ul style="list-style-type: none"><li>• Substantial reduction in DC power consumption with immersion cooling servers</li><li>• In spite of short term requirement, our material technology successfully developed new materials for optical connector products used in special refrigerants and has already been approved by our customers</li></ul>
<p><b>CPO (Co-Packaged Optics)</b></p> 	<ul style="list-style-type: none"><li>• Integration of IC and optical transmission functions to solve saving power consumption and more bandwidth requirements.</li><li>• Combines our optical devices, couplers and network technologies</li><li>• Attracting attention from IC chip manufacturers, etc.</li><li>• Will be developed into a wide range of Photonics-Electronics Convergence products in the future</li></ul>

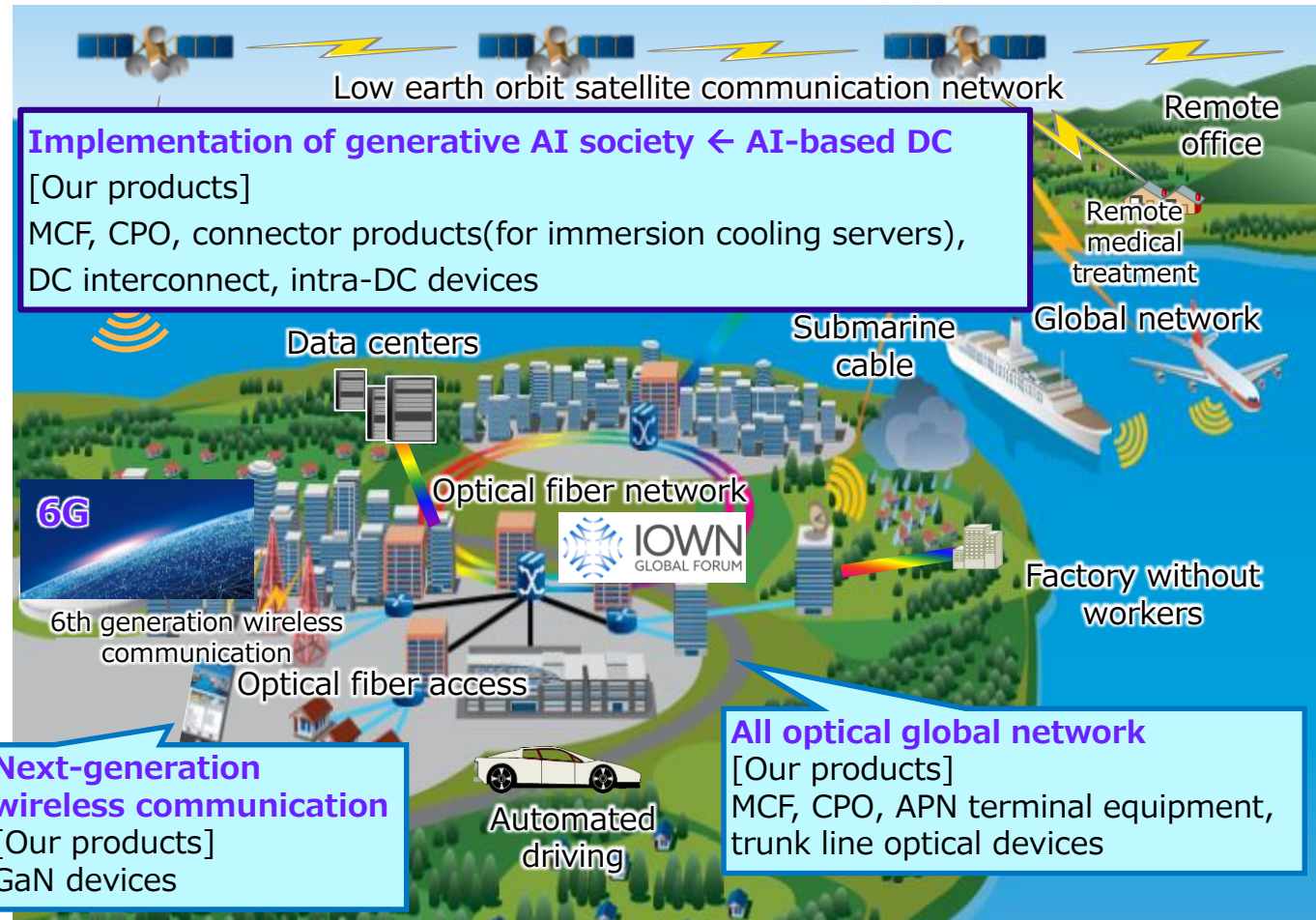
# Market Changes Toward 2030 and Our Efforts

We aim to grow by combining our comprehensive strengths with high-level technology and solutions.

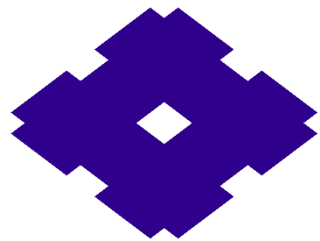
## Info-communications Sales Plan



Outlook



IOWN: Innovative Optical and Wireless Network (ALL optical NW concept)



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