



## **Dexerials Corporation**

Photonics Business Briefing Session

October 14, 2026

## Event Summary

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|                      |                                                                                 |                                                  |
|----------------------|---------------------------------------------------------------------------------|--------------------------------------------------|
| [Company Name]       | Dexerials Corporation                                                           |                                                  |
| [Company ID]         | 4980-QCODE                                                                      |                                                  |
| [Event Language]     | JPN                                                                             |                                                  |
| [Event Type]         | Special Announcement                                                            |                                                  |
| [Event Name]         | Photonics Business Briefing Session                                             |                                                  |
| [Fiscal Period]      |                                                                                 |                                                  |
| [Date]               | October 14, 2026                                                                |                                                  |
| [Number of Pages]    | 43                                                                              |                                                  |
| [Time]               | 13:00 – 14:35<br>(Total: 95 minutes, Presentation: 60 minutes, Q&A: 35 minutes) |                                                  |
| [Venue]              | Webcast                                                                         |                                                  |
| [Venue Size]         |                                                                                 |                                                  |
| [Participants]       |                                                                                 |                                                  |
| [Number of Speakers] | 3                                                                               |                                                  |
|                      | Yusuke Kamata                                                                   | Corporate Strategy Division Deputy Division Head |
|                      | Masaaki Kinoshita                                                               | Photonics Sales Department General Manager       |
|                      | Ryota Washimori                                                                 | PR & IR Department General Manager               |
| [Analyst Names]*     | Mikiya Yamada                                                                   | Mizuho Securities                                |
|                      | Hiroharu Watanabe                                                               | SMBC Nikko Securities                            |
|                      | Hidemitsu Umebayashi                                                            | Daiwa Securities                                 |

\*Analysts that SCRIPTS Asia was able to identify from the audio who spoke during Q&A or whose questions were read by moderator/company representatives.

# Presentation

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**Moderator:** It is time to commence the Photonics Business Briefing Session of Dexerials Corporation.

First, let me introduce the attendees. Yusuke Kamata, Corporate Strategy Division Deputy Division Head. Masaaki Kinoshita, Photonics Sales Department General Manager. Ryota Washimori, PR & IR Department General Manager. These three are attending from the Company. The briefing is scheduled to end at 14:30.

We would like to share the following information with all participants in the Zoom webinar. Today's materials are available on the Dexerials Corporation's investor relations website. That is for your reference. Before we begin our business presentation, Washimori will say a few words.

**Washimori:** Hello, everyone. This is Washimori from the Public Relations and Investor Relations Department. Thank you for taking the time out of your busy schedules to attend our photonics business briefing today. In 2022, our company acquired Kyoto Semiconductor as part of our group, thereby acquiring its optical semiconductor business. While there have been various news reports recently about the rising demand for data centers driven by generative AI, we feel that significant opportunities for business growth are emerging in the photonics business we operate.

Given these circumstances, I would like to take this opportunity today to discuss the types of businesses we are currently operating, how we view the market, and what growth opportunities we believe exist within that market. Today, I'd like to use this opportunity to thoroughly share with all of you the excitement we feel about this business over the medium to long term, so I appreciate your attention. Now, Kamata will give a presentation on our business. Thank you for your attention.

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## Photonics Business Briefing

### Photonics Business Environment and Overview

#### 1. High-speed Response Photodiodes (PDs)

- Production outlook for Tome and Eniwa operations
- Procurement initiatives
- Business expansion: 200G collaboration with TIA manufacturers
- Next-generation 400G initiatives

#### 2. Edge-illuminated Monitor PDs

- Business Expansion initiatives: Maximize sales opportunities with chip sizes tailored to laser light source use cases

#### 3. Monitor PDs and Assemblies

- Profit growth initiatives: Cost reduction and productivity improvements to support sales growth in Scale-Across and Scale-Out

### Photonics Value Creation and Business Expansion

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2

**Kamata:** Hello everyone. My name is Kamata from the Corporate Strategy Division at Dexerials. Since today's session is a business presentation, I'd like to explain the details.

Here is the content of the business briefing. First, I would like to provide a summary of the business environment surrounding our photonics business and an overview of the business. Following that, I will discuss high-speed response photodiodes, edge-illuminated monitor PDs, and third, monitor PDs and assemblies. Since there are roughly three product categories, I would like to explain our initiatives for expanding each business and our production outlook. Finally, I would like to provide a summary of our business expansion.

To begin with, and as will be mentioned several times going forward, high-speed response photodiodes are devices that receive light signals and convert them into electrical signals. Amid the recent surge in demand for data centers, it has become a key component.

Setting aside the edge-illuminated monitor PDs for a moment, let's talk about what a monitor PD is. In this case, the photodiode is the component that receives the optical signal, while the laser diode is the component that emits it. The PD used for monitoring serves as an automatic optical output control mechanism to ensure that the laser diode emits light at the correct intensity. Any instance where "PD" appears is an abbreviation for "photodiode." A PD for monitoring is generally located near the laser. High-speed response photodiodes are not located on the laser side; rather, they detect the light emitted by the laser from a great distance away. I hope you'll understand the differences here.

Among these, the high-speed response photodiodes under number one are currently the hottest area in terms of both speed improvements and growing demand. As for number 2 and number 3, in line with the evolution of data center networks, which I will explain later, significant opportunities for demand are emerging.

## Position of the Photonics Business within the Dexerials Group

|                  | Dexerials                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                      |                                                                                       | Dexerials Photonics Solutions (DXPS)                                                  |                                                                                       |
|------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                  | Optical Materials                                                                   |                                                                                     |                                                                                     |                                                                                     | Electronic Materials                                                                |                                                                                      |                                                                                       |                                                                                       |                                                                                       |
| Products         | Optical Elastic Resin (SVR)                                                         | Smart precision Adhesives                                                           | Anti-reflection Film (ARF)                                                          | Anti-reflection Film Moth-eye type                                                  | Anisotropic Conductive Film (ACF)                                                   | Secondary protection fuse                                                            | Adhesive Tape                                                                         | Optical Semiconductors                                                                | Inorganic Optical Components                                                          |
|                  |  |  |  |  |  |  |  |  |  |
| Business Domains | Electronics                                                                         |                                                                                     |                                                                                     |                                                                                     | Automotive                                                                          |                                                                                      |                                                                                       | Photonics                                                                             |                                                                                       |
|                  | Existing                                                                            | Growth                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                      |                                                                                       |                                                                                       |                                                                                       |
|                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                      |                                                                                       |                                                                                       |                                                                                       |
|                  | Displays (Smartphones/ Tablets)                                                     | Camera Modules (Smartphones)                                                        | Displays (Laptops/ Smartphones)                                                     | Medical Face Shields (DxShield)                                                     | Displays, MicroLEDs, and Camera Modules                                             | Power Tools, Smartphones, and DC BBU*1                                               | Metal Cards and FPC*2 Bonding                                                         | High-brightness Projectors                                                            |                                                                                       |
|                  | Automotive Displays                                                                 | ADAS Cameras and Sensors                                                            | Automotive Displays                                                                 | HUDs (Head-Up Displays)                                                             | Automotive Displays and Sensors                                                     | E-bikes and BEVs                                                                     |                                                                                       | High-speed Response Photodiodes for Communications and Sensors                        |                                                                                       |
|                  | Accelerating R&D to Contribute Through Photoelectric Fusion                         |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                      |                                                                                       | Optical Components for Communications and Sensors                                     |                                                                                       |

\*1: Battery Backup Unit \*2: Flexible Printed Circuit Board

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3

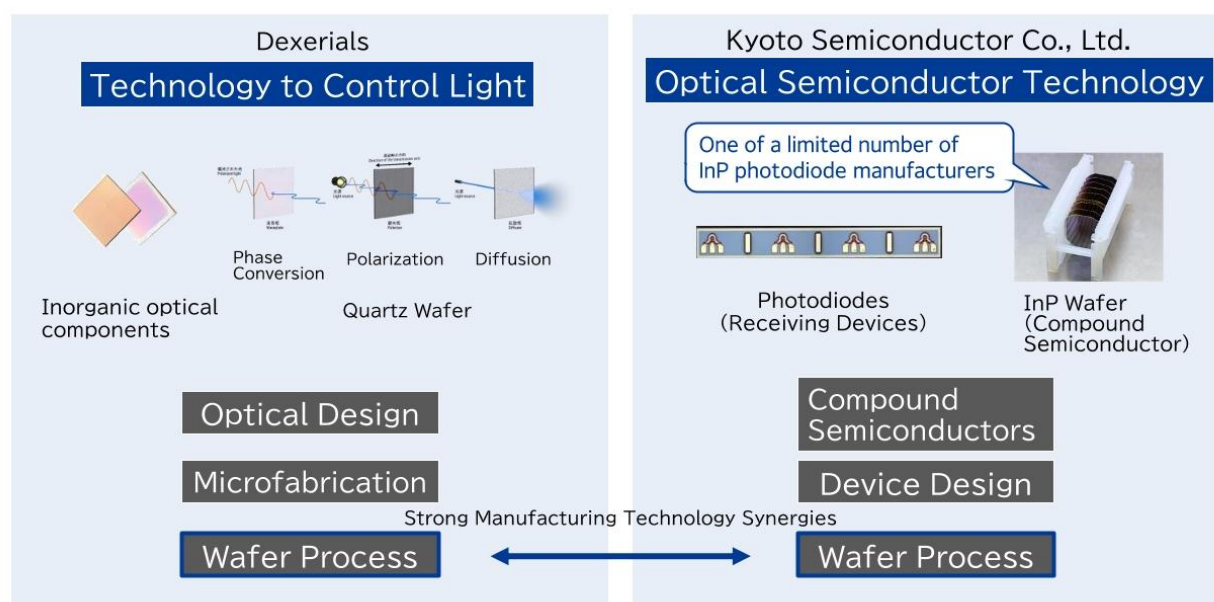
First, let's look at the positioning of the photonics business within Dexerials.

The main products in this business are those commonly referred to as chemical products, such as the resin materials, adhesives materials, and anti-reflection films that you are likely familiar with, which are primarily designed for the mobile IT sector. Regarding photonics and optical semiconductors, the way they're arranged feels a bit off, and we get the impression that there isn't much logical connection vertically. The Company was originally established in 1962 as Sony Chemical, the predecessor of Dexerials.

At that time, while Sony was importing adhesive-coated copper foil film from the US, the Company was established to begin manufacturing it in-house. One example of a device that used adhesive-coated copper foil film was the TR-55 portable radio. It is portable, compact, and a radio, and communication device was destined from the start to be portable and compact. We had possessed both organic chemistry technology, specifically, adhesive technology, and inorganic chemistry material technology, specifically, thin-film copper technology, since the Company's founding. In terms of consistent applications, these include mobile IT, such as laptops, smartphones, and tablets, as well as, in the past, televisions and, before that, radios. We have a history of proposing products and working together to drive technological innovation in these areas.

As for optical semiconductors, they are the inorganic optical components shown on the far right. Since we had been using techniques such as sputtering and CVD to form thin films on glass, our processes were highly compatible with optical semiconductor manufacturing. Dexerials is a company that has been developing products by combining inorganic and organic chemistry. Among these, optical semiconductors are the only ones that operate on electricity. Apart from that, no other products operate on electricity. In that sense, this device is one I have very high hopes for.

### Dexerials Photonics Solutions Corporation (Operations began in April 2024)



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4

As I mentioned earlier, these are inorganic optical elements based on light-controlled technology, such as phase conversion, polarization, and diffuser plate, which are used in high-output projectors, such as those for projection mapping. Since the projection uses a very bright light, if you try to place an object on top of a plastic film and process it to achieve certain optical performance, the plastic film will degrade due to the light and will not last very long. If these components are fabricated on a quartz wafer, as they are essentially all inorganic materials, they are extremely durable and can be used even in projectors with high light output. We already possessed this technology for manipulating light.

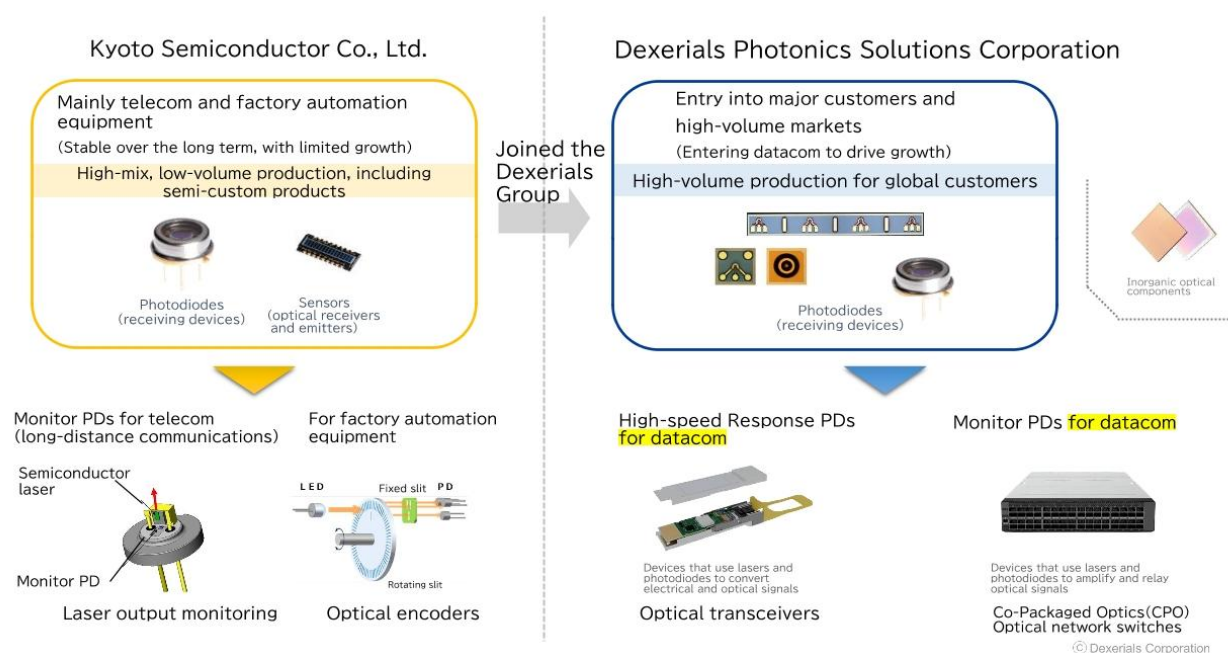
Under such circumstances, Kyoto Semiconductor joined our group in 2022. It says "optical semiconductor technology," and InP stands for indium phosphide, so this is an InP wafer. In terms of manufacturing this as a photodiode, whether using an InP wafer or a quartz wafer, the wafer fabrication processes share a high degree of commonality. There are only a limited number of manufacturers that actually handle and develop InP wafers. I've included a photo of a photodiode which is the long, horizontal one, and you can probably see four

similar patterns here. Each serves as a receiving device, and this photodiode is capable of receiving four signals simultaneously with a single chip.

There is a photo of the InP wafer on the right. You can see that the black, plate-like object on the white plastic tray. Sorry it is bit hard to see. In optical communications, it is common to receive infrared light. Optical fiber is made of quartz. Among these, infrared light has the longest wavelength, and the basic principles behind infrared lasers and infrared photodiodes have been understood since around the 1960s. Because it is dark in color, you might think it absorbs infrared light, but it is strictly visible light; while it appears dark to the human eye, it is transparent when viewed in the infrared spectrum. First of all, light penetrates deep inside.

For example, with transparent glass and the like, since it's transparent, I think you can see through it. I think light passes through, but at the same time, it gets reflected off the surface. I think you can understand this from examples like window glass. Transparency and the fact that light is reflected off the surface are two separate phenomena. For these compound semiconductors as well, light transmittance is a key requirement. Since the surface inevitably causes reflection, it is necessary to apply an anti-reflective coating to the surface to ensure that light reaches the InP wafer.

## Driving Growth of the Dexerials Group



With the goal of making it a growth driver for the Dexerials Group, Kyoto Semiconductor had originally been manufacturing photodiodes using InP wafers. From a business perspective, their main focus is on the telecom and factory automation equipment sectors. "Telecom" refers to long-distance telecommunications; it does not mean telephone service, but rather data communication. Telecom refers to long-distance communications, such as intercontinental fiber-optic communications, including undersea cables. FA stands for factory automation, and the Company manufactured a wide variety of products in small batches, such as light curtain sensors and other light-emitting and light-receiving components that detect when a hand is inserted and automatically shut down the equipment.

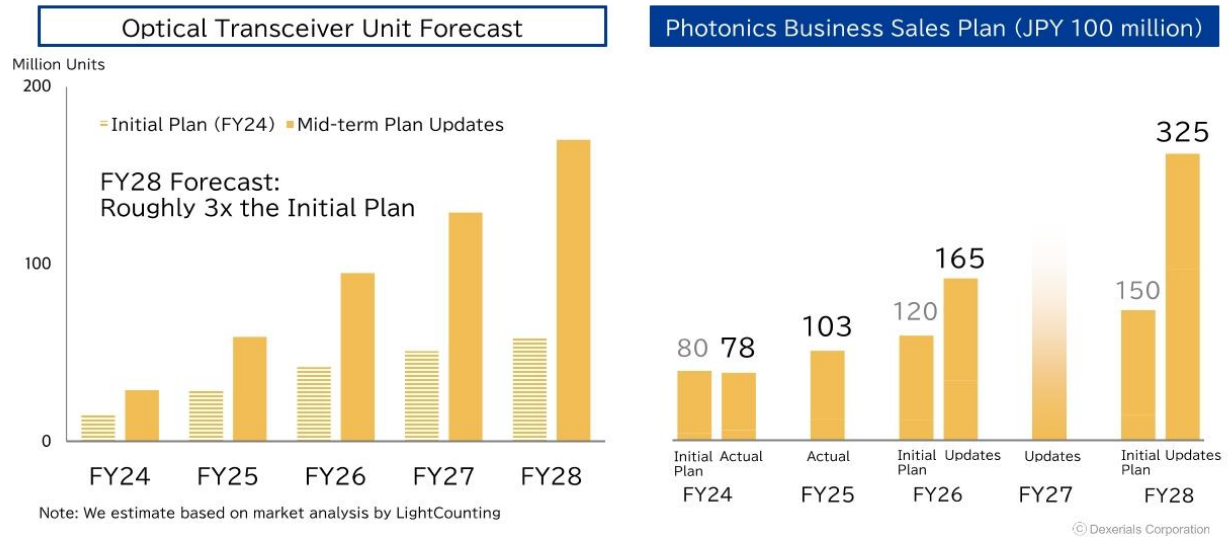
Under these circumstances, Kyoto Semiconductor merged with Dexerials, and in the process of the discussions about which areas to target and how to grow together, we decided on high-speed response photodiodes for datacom. In 2022, datacom was expected to see significant growth by targeting areas such as communications within data centers within a 10-km radius and by shifting its focus toward mass-volume production. It was

one of the conclusions drawn from PMI's activities at the time. As I'll explain in more detail later, I believe that, compared to 2022, it has become quite widespread in society including generative AI. I think we've been very fortunate that the business environment has evolved in a way that supports the growth of generative AI and applications, areas we hadn't originally considered, in relation to datacom.

## Expanding Growth Domains: Photonics Market Outlook and Sales Plan

Announced  
May 2026

Data Center Optical Transceiver Demand Is Doubling, Driving a Major Upward Revision to the Sales Plan  
We Aim to Become the Global Leader in High-speed Response Photodiodes



In May 2026, we will be halfway through our medium-term business plan, which began in 2024. In light of changes in the business environment surrounding photonics in particular, we have partially revised our plan. We have revised our actual sales forecast upward to JPY32.5 billion for FY2028, more than doubling the initial forecast of JPY15 billion.

One such item is the production volume of the optical transceivers shown on the left. Even compared to the projections made in 2024, the figures have become extremely large. We intend to view this as a genuine opportunity for business growth and, by announcing it publicly, aim to expand our business.

## InP Advantages in High-Speed Response PDs: Superior Performance

| Material               | InP<br>Indium phosphide                                                                                                                                                                                                                                                                                                                                            | SiGe<br>Silicon germanium                                                                                                                                                                                                                                                                                                  | GaAs<br>Gallium arsenide                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Detection wavelength   | Long wavelengths<br>(1310 nm / 1550 nm bands)                                                                                                                                                                                                                                                                                                                      | Near-infrared to long wavelengths<br>(850 nm-1550 nm bands)                                                                                                                                                                                                                                                                | Short wavelengths<br>(850 nm band)                                                                                                                                                                                                                                                                                                                                                                |
| Features and strengths | <ul style="list-style-type: none"> <li>Developed as an emitter/receiver material for optical communications</li> <li>The material's high carrier mobility enables high-speed operation.</li> <li>InP is considered the only option for 3.2T optical transceivers</li> <li>Roadmap for heterogeneous integration of InP receivers with silicon photonics</li> </ul> | <ul style="list-style-type: none"> <li>Can be integrated directly on silicon</li> <li>Low-cost fabrication on the same chip as IC circuits</li> <li>Compatible with silicon photonics</li> <li>Lower absolute performance than InP</li> <li>Growing adoption in medium-distance links, with gradual share gains</li> </ul> | <ul style="list-style-type: none"> <li>LEDs have established ecosystems in specialized lighting and sensing applications</li> <li>VCSELs and PDs have established ecosystems in communications</li> <li>Short wavelengths limit use to short distances</li> <li>Lower cost than InP-based materials; a strong candidate for high-speed, short-reach communications within data centers</li> </ul> |
| In brief               | Superior Performance                                                                                                                                                                                                                                                                                                                                               | Compact integration, relatively low cost                                                                                                                                                                                                                                                                                   | Short-reach applications, low cost                                                                                                                                                                                                                                                                                                                                                                |

We use InP for our high-speed response PDs

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7

Earlier, when discussing the difference between high-speed response photodiodes and monitor PDs, I explained our two main products: the photodiode, which receives signals, and the monitor PD, which monitors the laser light. As for light-receiving devices used in communications, there are generally these three types.

If we include visible light, silicon comes into play as well. I'm sure you've taken photos with digital cameras and the like. Those use CMOS silicon sensors, which are also light sensors. In the field of telecommunications, the three main types are indium phosphide, silicon germanium, and gallium arsenide.

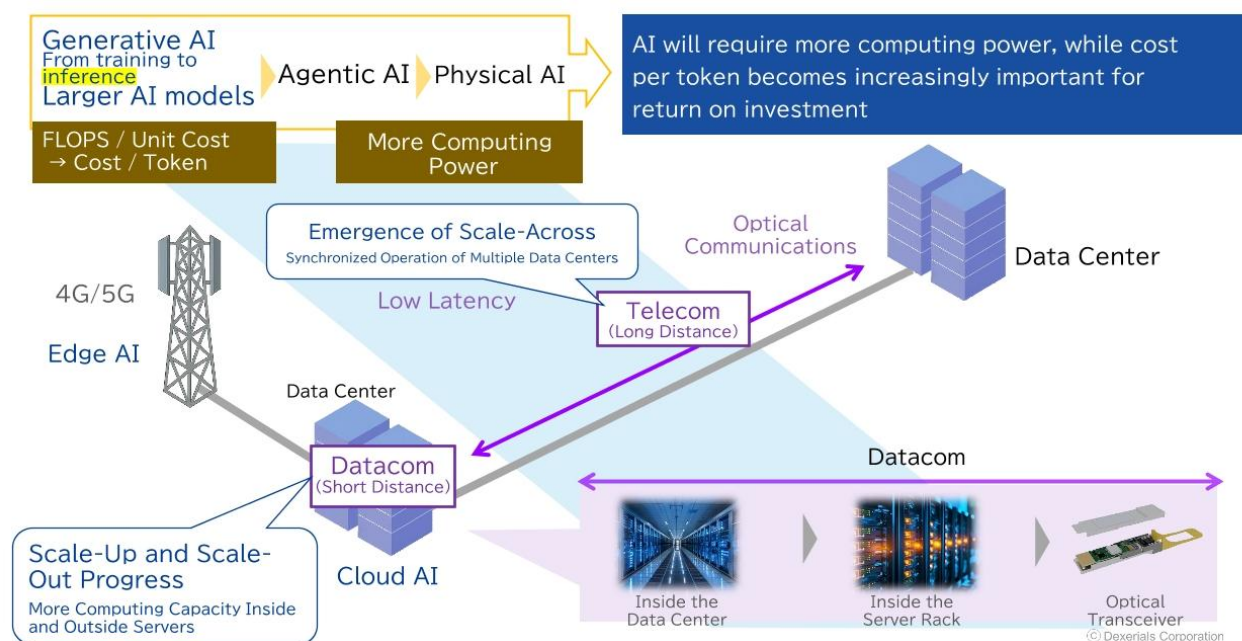
Both Dexerials' monitor PDs and high-speed response photodiodes use indium phosphide. Simply put, from the perspective of data transfer speeds, indium phosphide is currently considered to be the fastest material available in theory, giving it an absolute advantage in terms of performance.

I imagine silicon germanium is a term that most people aren't very familiar with. As I'll explain later, various chips are currently mounted individually on the circuit board; this is the configuration used in devices such as optical transceivers. Silicon photonics, which aims to integrate all chips onto a silicon substrate to achieve miniaturization, is expected to become widespread in the near future, and such technology already exists today. Currently, silicon photonics uses a silicon wafer to integrate various functional components onto it. At the same time, in the light-receiving section, silicon germanium can be fabricated directly on top of silicon. Since this can be manufactured using the wafer process, it has the advantage of being produced at the same time as the silicon wafers. In terms of cost, it would be inexpensive. However, in terms of performance, it falls short of indium phosphide in some respects.

Another point that concerns us a bit is that, compared to indium phosphide, silicon germanium can be fabricated directly on silicon, which makes the process very simple, but its sensitivity is sometimes not very good. Lasers require a fairly high power level; compared to the laser power required for indium phosphide photodiodes, they require about 20 to 30 times as much power. Given recent issues with electricity and other utilities, even if the initial costs are low, there is still the question of what the operating costs will be. As these applications are used for different purposes, indium phosphide will inevitably be used in areas where speed is essential.

Gallium arsenide, on the far right, is already widely used in applications such as LED lighting. Vertical-emitting lasers and gallium arsenide-based devices, such as micro-LEDs, are now becoming available. For short-distance applications, it currently offers the greatest advantages, including cost. For example, when connecting chips over distances of a few meters or tens of meters, gallium arsenide seems to be the best choice.

## AI Evolution Is Reshaping Data Center Networks



Here is the evolution of data center networks.

As I mentioned earlier regarding data communications and telecommunications, in the case of telecommunications, long-distance lines can be 600 km or more, or 500 km or more. Datacom is within 10 km. Furthermore, the prevailing view is that as distances continue to shrink—from 2 km to 1 km, 500 m, 100 m, 10 m, 1 meter, 10 cm, 1 centimeter, and even 1 millimeter—light will ultimately be the technology of choice.

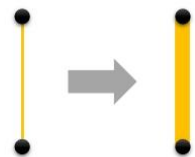
The reason for this is that generative AI is currently shifting from training to inference, and AI models are becoming increasingly massive. While FLOPS per cost refers to the amount of computation per unit of cost, there has recently been a shift in the tech world toward using the term “cost per token,” that is, cost per token, which places greater emphasis on profitability. I think there are quite a few AI services on the market these days, but I understand that the current trend is to determine whether they can actually recoup their costs through monetization.

In that context, it's noted in the top-left corner as scale-up and scale-out. I think a good example of how a so-called data center can be made faster is when, for instance, the GPUs or CPUs in the servers are upgraded to the next generation. Furthermore, since many connections are still made via electrical wiring, work is currently underway to replace them with fiber-optic connections.

Furthermore, in scenarios where a single data center is insufficient to handle the computational load or where computational resources would otherwise go to waste, the concept of scale-across—achieved by synchronizing and connecting data centers—has emerged as a recognized term since last year. Regarding this point, some have suggested that since the connection is already fiber-optic, there might be no change. However, scale-across is not about data transfer; rather, it requires synchronizing computations between

remote data centers. This means that data latency is not acceptable, and it requires not just high speed, but low latency, which is one of the defining features of scale-across.

## What Low Latency Means for Scale-Across

| Item             | High Speed                                                                                                                         | Low Latency                                                                                                                                                                                                                   |
|------------------|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Road Analogies   | Number of lanes (traffic carried at once)                                                                                          | Time for a vehicle to reach its destination                                                                                                                                                                                   |
| Main Units       | Gbps (gigabits per second)                                                                                                         | ms (milliseconds)                                                                                                                                                                                                             |
| Key Use Cases    | Transfer of very large files <ul style="list-style-type: none"> <li>4K/8K video streaming</li> <li>Large file downloads</li> </ul> | Real-time applications <ul style="list-style-type: none"> <li>Online gaming, videoconferencing, autonomous driving, and telemedicine</li> <li>Synchronized AI processing (Processing stops while waiting for data)</li> </ul> |
| Main Constraints | <ul style="list-style-type: none"> <li>Limited frequency bandwidth</li> <li>Network congestion and interference</li> </ul>         | <ul style="list-style-type: none"> <li>Physical distance and router processing time</li> <li>BER (Bit Error Rate)</li> </ul>                                                                                                  |
| Solutions        | Increase Bandwidth (Add More Lanes)<br>           | Shorter Distances and Fewer Hops           → Increase Optical Link Counts<br>                                                               |

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The question is what “low latency” actually means.

The "gigabit per second" on the left under high speed is a figure you're probably all familiar with; it refers to the amount of data that can be transferred per second. The most common approach to speeding this up is to increase the bandwidth. When it comes to low latency, the unit of measurement is not the amount of information per unit of time, but rather milliseconds, specifically, the time it actually takes for the data to arrive.

When you're using a smartphone in Tokyo or other areas, you might notice that data doesn't seem to load at all when it's crowded. If a connection is established even for a split second, it might be possible to download something during that time because the speed is so high, but high speed and zero latency are two separate issues. Even if the speed is slow, it is extremely important to maintain a steady, continuous connection. When it comes to real-time performance, if the synchronization of AI computation data means that Data Center B cannot perform the next calculation until Data Center A has produced its results, then any delay is simply unacceptable.

As an example, though this is an extreme case, let's say there are six data centers, each connected in a circular configuration. When transferring data to a data center on the opposite side, the data must pass through at least two data centers. If we do that, it will cause a delay. This is because processing time at routers at intermediate points occurs along the way.

As explained on the right, the scale-across approach aims to ensure real-time performance by directly connecting all data centers to reduce that lag. Originally, there is a DCI or Data Center Interconnect, and in terms of low latency, it is essential that data centers be connected via the shortest possible route. In this case, the number of optical links increases. In an optical link, a laser and a photodiode are located at each end, respectively. The shift from traditional Data Center Interconnects to scale-across is becoming a major trend, as it is creating significant demand as a business opportunity.

## From Scale-Across to Scale-Out, Scale-Up, and Scale-In?

The development race has already begun

| Category     | Typical Distance  | Full-scale Adoption (Our forecast)                                                                                | Representative Equipment / Technology                                                                                                                                                                          |
|--------------|-------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Scale-In     | 25 cm             | 2030 onward?                                                                                                      | <ul style="list-style-type: none"> <li>In-package interconnects (silicon/glass interposers, silicon photonics, UCIe, CPO, CoWoS, etc.)</li> </ul>                                                              |
| Scale-Up     | 7 m               | Release from 2028<br>Full-scale adoption from 2029                                                                | <ul style="list-style-type: none"> <li>NVIDIA "Feynman" GPU NVLink 8 protocol with CPO</li> <li>Direct GPU connections shifting from copper cable to optical fiber</li> </ul>                                  |
| Scale-Out    | 50 m-2 km         | Full-scale network switch adoption from 2027                                                                      | <ul style="list-style-type: none"> <li>InfiniBand Switch (Quantum-X)</li> <li>Ethernet Switch (Spectrum-X)</li> <li>Optical transceivers (pluggable optics / CPO)</li> </ul>                                   |
| Scale-Across | 10 km-600 km      | DCI from 2024<br>Evolution into Scale-Across from 2026, latency below 5ms<br>Full-scale adoption around 2028-2029 | <ul style="list-style-type: none"> <li>DCI switches and coherent optical transceivers</li> <li>DWDM</li> <li>(ZR/ZR+) 800G/1.6T Coherent Optical Transceiver</li> </ul>                                        |
| Long-Haul    | 300 km-10,000 km+ | Growth from 2023                                                                                                  | <ul style="list-style-type: none"> <li>Long-haul optical transport (WDM / ROADM)</li> <li>Submarine cable systems</li> <li>Coherent long-haul optical equipment</li> <li>Raman amplifiers and EDFAs</li> </ul> |

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There are scale-across, scale-out, scale-up, and scale-in. I believe scale-in is a concept that has been added relatively recently.

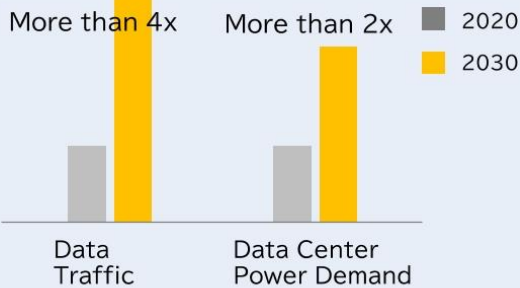
The ranges for scale-across are from 10 km to 600 km, for scale-out is 2 km or less, for scale-up is 7 m, and for scale-in is 25 cm. These distances are rough estimates and not exact, but scale-across is now getting underway in 2025 and 2026. For scale-out, the network switch will be in 2027; for scale-up, in 2028 and 2029; and for scale-in, in 2030. We anticipate that technologies such as those listed on the far right will enter the market sometime around 2030. As for the technologies on the far right, you only need to give each one a quick glance, but the fact that these names are coming up means the development race has already begun. The general outlook is that it will eventually make its way into the market.

## Why Is Optical Communication Replacing Electrical Communication? - Sustainability of Growth and Physical Limits

### Reason 1: Technology Progress Is Not Sustainable

#### Global Forecast

High Potential to Become  
a Major Social Challenge



### Reason 2: Physical Limits of Electricity

#### Transmission Speed

Optical communication is at least **10x** faster.



#### Energy per Unit of Transmission Speed

Optical communication is **100x** more efficient  
It can transmit data using 1/100  
the power of electrical communications



Target: 1 pJ/bit

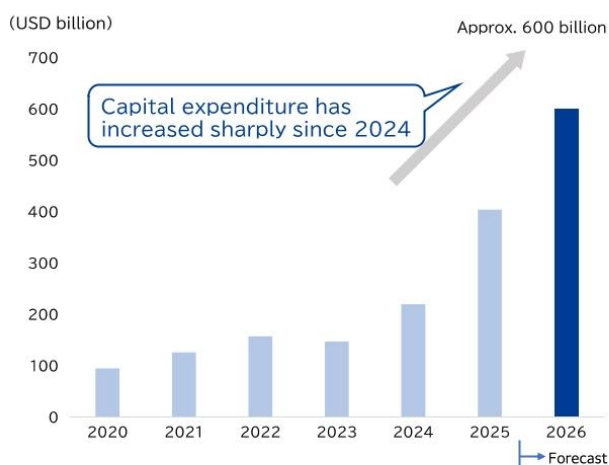
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11

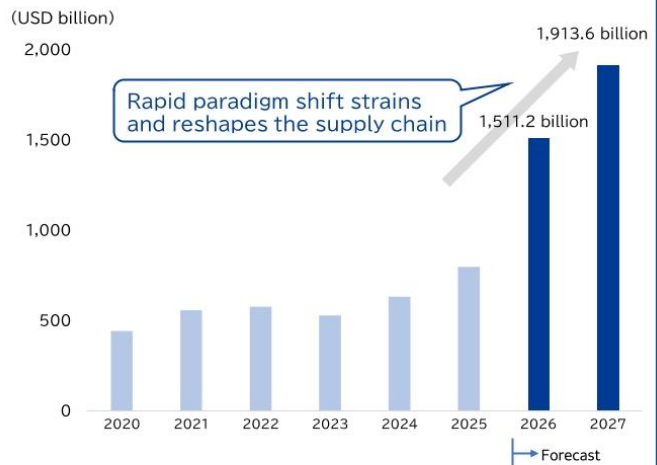
This is a comparison between optical communication and electric communication based on projections from 2020. By 2030, data traffic and the power demand of data centers are expected to reach extremely high levels; in fact, if we continue to rely solely on electricity, this is the outcome we'll face. We should switch to optical communication. The reason to switch to optical communication is because optical communication is faster, and in terms of energy consumption per unit of data transfer, it requires very little energy. That is the advantage of optical communication.

## Business Environment – Major Hyperscalers' Capital Expenditure Trends

### Capital Expenditure of Five Major Hyperscalers



### Global Semiconductor Market Size



Left: Our compilation based on company disclosures and other publicly available information.  
Right: Our compilation based on the WSTS Spring 2026 Semiconductor Market Forecast.

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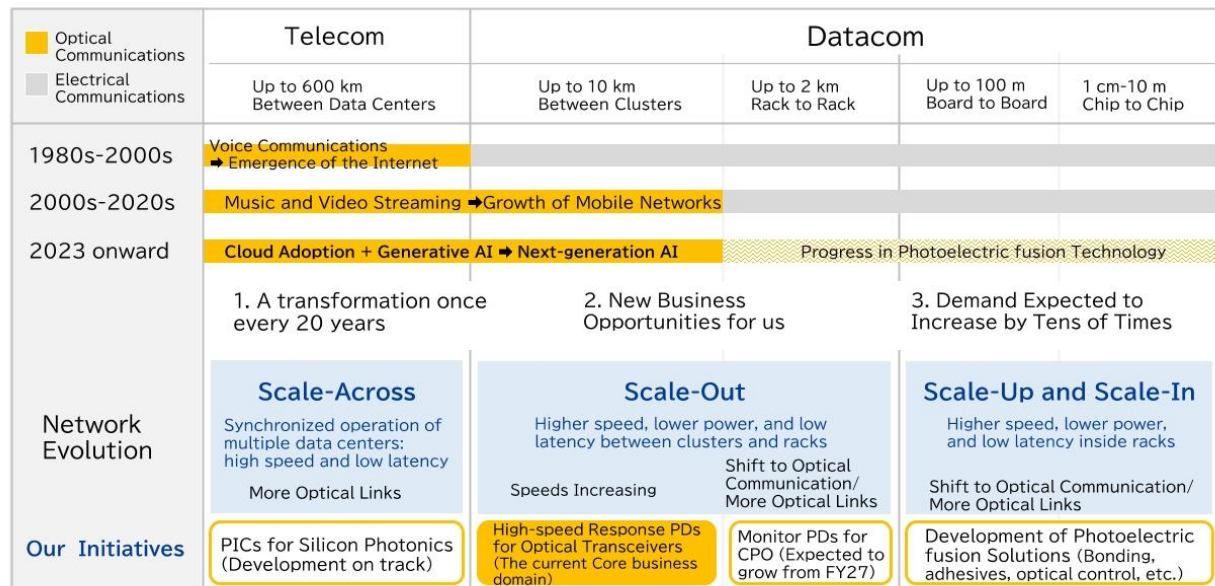
12

As a business environment, this is the capital expenditures of major hyperscalers. The forecast for 2026 is USD600 billion, and there have been some news stories suggesting it might be higher, and some suggesting it

might not. Since 2024, as generative AI including ChatGPT has become increasingly widespread, significant capital investments have been made.

The one on the right is a semiconductor, not an optical semiconductor. Memory manufacturers and others find that producing HBM, a type of memory designed for AI data centers, yields much higher profit margins than producing standard memory, so they're prioritizing that. Consequently, memory prices for smartphones have risen, and as you're likely aware, this has led to significant changes in the supply chain, including shifts in the hierarchy.

## Business Environment: Photoelectronic Fusion Creates New Opportunities



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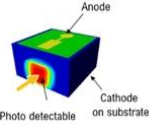
13

Here is a diagram showing the relationship between telecom and datacom, along with scale-across' position within that framework.

I don't think the concept of a data center even existed in the 1980s, 2000s, or 2020s. We view this scale-across initiative as a once-in-20-years transformation. This represents a new business opportunity for our company as well, and demand has grown significantly compared to when we launched our mid-term plan in 2024. We anticipate that demand, including for scale-across, will increase more than tenfold in the future.

The bottom row shows our initiatives. Our current core business is high-speed response PDs for optical transceivers in the data communications sector. We are also working diligently on the development and sales preparations for our other products. In each of the scale-across, Out, Up, and In areas, we are working hard to prepare for opportunities where our company can do business.

## Business Overview: Three Main Product Groups

| Product Group | 1. High-speed Response PDs                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                               | 2. Edge-illuminated Monitor PDs                                                                                                                                                   | 3. Monitor PDs and Assemblies                                                                                                                                     |                                                                                                                                                                                               |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product       | High-speed Response PD chips                                                                                                                                                                                                                                                                                                                                                                                                                      | High-speed Response PD assemblies                                                                             | Edge-illuminated monitor PD chips                                                                                                                                                 | Surface-illuminated monitor PD chips                                                                                                                              | Mini-can packages and assemblies                                                                                                                                                              |
| Form          | 100G/lane (4-channel array)<br><br>200G/lane (single channel)<br><br>Front side<br><br>With backside lens<br> | CoC<br>(Chip on Carrier)<br> |                                                                                                  | Front side<br>                                                                 |                                                                                                            |
| Use Features  | <ul style="list-style-type: none"> <li>Optical transceivers for high-speed communications within data centers</li> <li>Optical signal reception with ultra-high-speed response</li> <li>Designs tailored to customer needs</li> </ul>                                                                                                                                                                                                             |                                                                                                               | <ul style="list-style-type: none"> <li>Can be placed coaxially with the laser</li> <li>Real-time optical power monitoring</li> <li>Products tailored to customer needs</li> </ul> | <ul style="list-style-type: none"> <li>Low dark current / low capacitance</li> <li>Real-time optical power monitoring</li> <li>Customization available</li> </ul> | <ul style="list-style-type: none"> <li>Sealed packages for long-term reliability</li> <li>Compatible with various standard connectors</li> <li>Products tailored to customer needs</li> </ul> |
| Use Cases     | Scale-Out<br>Scale-Across                                                                                                                                                                                                                                                                                                                                                                                                                         | Scale-Across                                                                                                  | Scale-Out                                                                                                                                                                         | Scale-Across                                                                                                                                                      | Scale-Across                                                                                                                                                                                  |

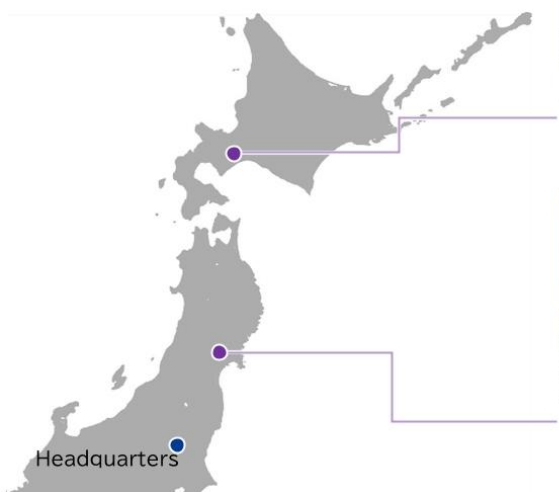
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14

As explained at the beginning, there are three product groups: first, high-speed response PD chips, assemblies, and CoC (chip-on-carrier); second, edge-illuminated monitor PD; and third, monitor PDs, which are standard products where light enters from the top rather than from the side; and on the far right are Mini-Can assemblies. I've listed the use cases for each of them at the bottom. I've written the areas where demand for scale-across is growing and our products to meet its needs.

## Business Overview: Sites and Main Products

### Dexerials Photonics Solutions Sites



Eniwa Operation  
Existing Production of Optical Semiconductors  
(formerly Kyoto Semiconductor)



Tome Operation  
New optical semiconductor production  
(operations began in April 2026)

### Main Products

- High-speed Response PDs
- Edge-illuminated monitor PDs
- Monitor PDs and assemblies



- High-speed Response PDs
- Inorganic optical components



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15

This section provides an overview of our business, including our sites and main products.

First, the Eniwa Operation. This is the former Kyoto Semiconductor operation. We have been manufacturing optical semiconductors for some time now. At the Tome Operation, a new optical semiconductor production line has been in operation since April of this year. The product lines for each category are as listed here.

## 1. High-speed Response Photodiodes (PDs)

- Production outlook for Tome and Eniwa operations
- Procurement initiatives
- Business expansion: 200G collaboration with TIA manufacturers
- Next-generation 400G initiatives

| Product Group | 1. High-speed Response PDs                                                                                                                                                                                                                  |                                                                                                            | 2. Edge-illuminated Monitor PDs                                                                                                                                                         | 3. Monitor PDs and Assemblies                                                                                                                                           |                                                                                                                                                                                                     |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product       | High-speed Response PD chips                                                                                                                                                                                                                | High-speed Response PD assemblies                                                                          | Edge-illuminated monitor PD chips                                                                                                                                                       | Surface-illuminated monitor PD chips                                                                                                                                    | Mini-can packages and assemblies                                                                                                                                                                    |
| Form          | 100G/lane (4-channel array)<br>200G/lane (single channel)<br><br>         | CoC (Chip on Carrier)<br> | <br>Aside<br>Photo sensitive area<br>Cathode on substrate area                                         | Front side<br>                                                                       | <br>                          |
| Use Features  | <ul style="list-style-type: none"> <li>• Optical transceivers for high-speed communications within data centers</li> <li>• Optical signal reception with ultra-high-speed response</li> <li>• Designs tailored to customer needs</li> </ul> |                                                                                                            | <ul style="list-style-type: none"> <li>• Can be placed coaxially with the laser</li> <li>• Real-time optical power monitoring</li> <li>• Products tailored to customer needs</li> </ul> | <ul style="list-style-type: none"> <li>• Low dark current / low capacitance</li> <li>• Real-time optical power monitoring</li> <li>• Customization available</li> </ul> | <ul style="list-style-type: none"> <li>• Sealed packages for long-term reliability</li> <li>• Compatible with various standard connectors</li> <li>• Products tailored to customer needs</li> </ul> |
| Use Cases     | Scale-Out                                                                                                                                                                                                                                   | Scale-Across                                                                                               | Scale-Out                                                                                                                                                                               | Scale-Across                                                                                                                                                            | Scale-Across                                                                                                                                                                                        |

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16

I'd like to explain the three products I mentioned earlier. First, I'd like to explain high-speed response PD.

## 1. Applications of Our High-Speed Response PDs

[Application Example]

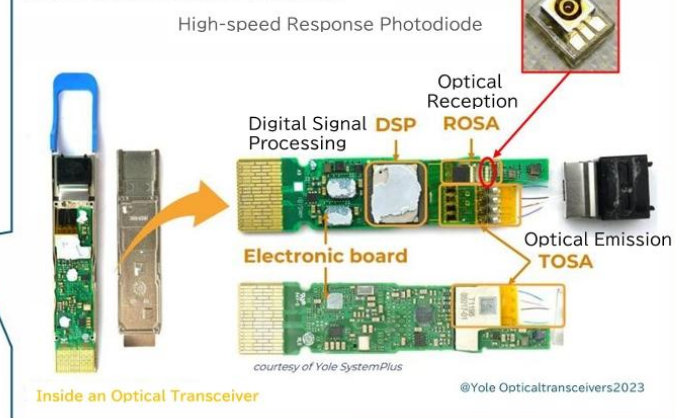
### Optical Semiconductor Devices



Optical semiconductors convert electrical signals into light and optical signals into electricity. Devices that incorporate these components are called optical semiconductor devices. Our products are used in optical transceivers for data centers and other applications.

### Photodiodes for Optical Transceivers

[Implementation Example]

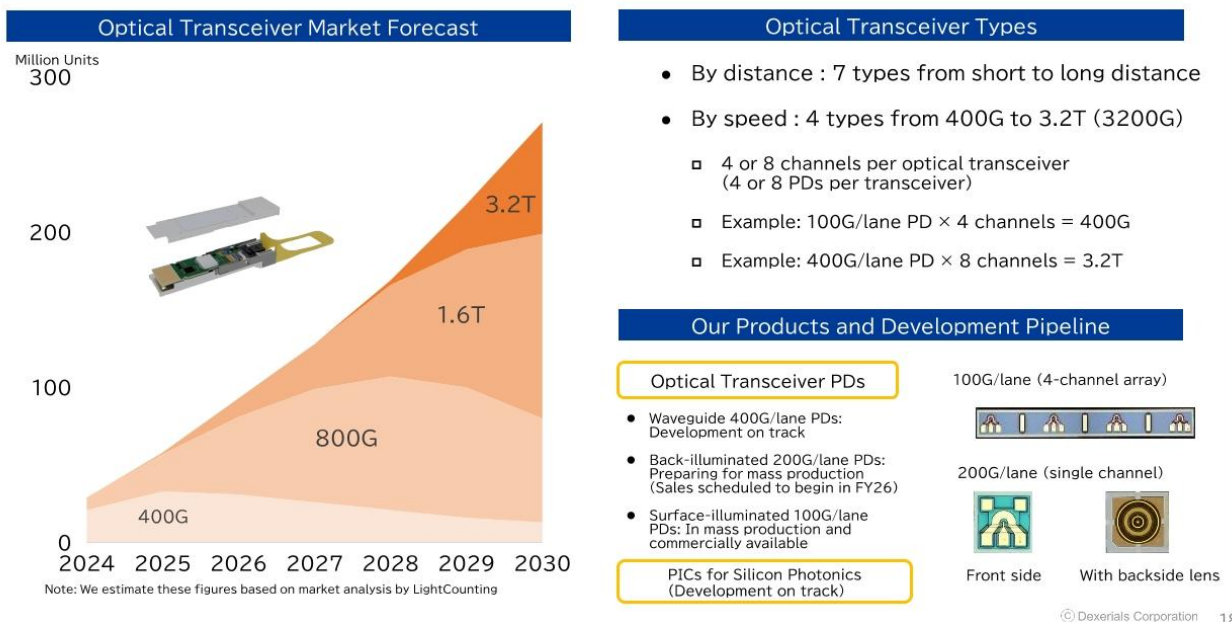


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17

This is a diagram of an optical transceiver. Shown on the right is what the transceiver looks like when it's taken apart. The area labeled "ROSA" is the light-receiving section, and a photodiode is housed here. The areas that say "TOSA" are the light-emitting sections; they contain a laser and convert the optical signals from the optical fiber into electrical signals using a ROSA. Behind it are the actual servers and other equipment, and once the results come back from there, they are sent out again as a laser light signal.

## 1. Optical Transceiver Market and Types – Our Products and Development Pipeline

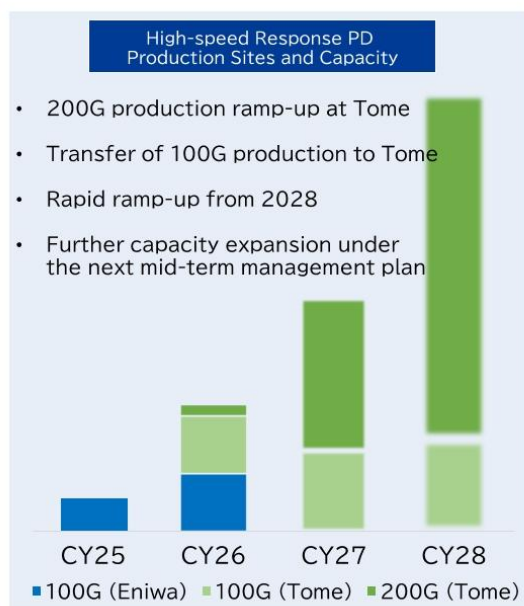


Here is the market demand forecast for optical transceivers.

400 Gbps, 800 Gbps, 1.6 Tb, 3.2 Tbps —these are the speeds per optical transceiver. As noted on the right, there are roughly seven types of optical transceivers, classified by distance. By speed, there are four types ranging from 400 Gbps to 3.2 Tbps and up to 3,200 Gbps. Each optical transceiver will have 4 or 8 channels and will be equipped with 4 or 8 photodiodes, respectively. If a single photodiode operates at 100 Gbps and there are four channels, multiplying those values results in a 400 Gbps optical transceiver.

Dexerials sells 100 Gbps products as part of that lineup. As for the 200 Gbps plan, we are currently preparing to launch it. As for the 100 Gbps one, I think there was a photo of it at the beginning, there are four of the same kind. Since there are four channels per unit, even at 100G/lane, a single unit provides 400 Gbps of speed.

## 1. Production Capacity Outlook for Tome and Eniwa Operations



Eniwa Operation (DXPS)  
Existing optical semiconductor production site



Tome Operation (DXPS)  
New optical semiconductor production site  
(operations began in April 2026)

### Main Products

- High-speed Response PDs  
➔ Transfer to Tome
- Edge-illuminated monitor PDs
- Monitor PDs and assemblies



- High-speed Response PDs
- Inorganic optical components



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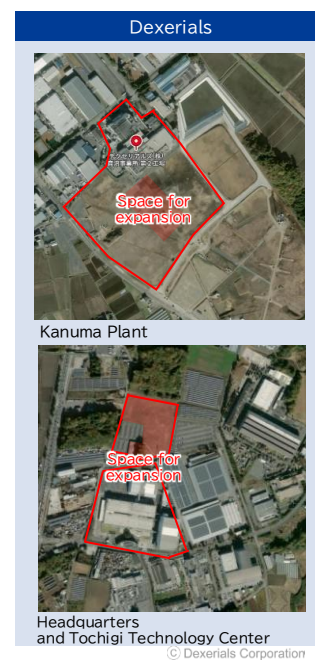
19

This is the production capacity forecast for the Tome and Eniwa Operation.

With regard to high-speed PD, we will gradually transfer operations from Eniwa to Tome. Furthermore, we will raise the capacity as well. The blue part represents the capacity of the 100 G/lane photodiodes in Eniwa. The light green one is the 100 Gbps Tome product, and the dark green one is the 200 Gbps Tome product. We will proceed simultaneously with the transfer to Tome and the launch of the project. At the Eniwa Operation, we will continue to produce and increase production of edge-illuminated monitor PDs, as well as monitor PDs and assemblies.

## 1. Production Sites Strategy to Meet Growing Demand

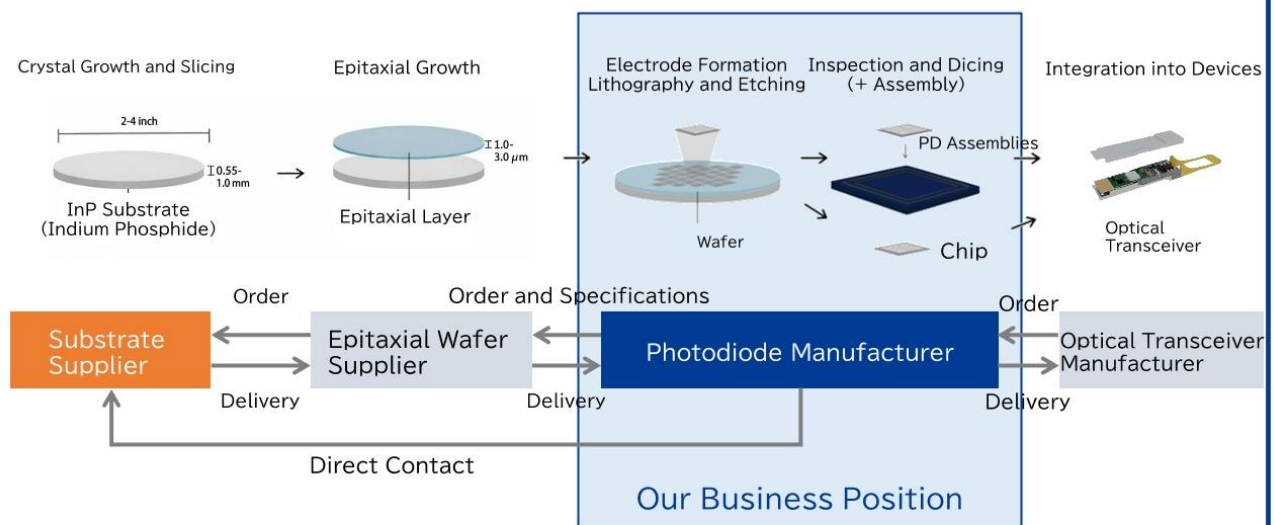
- Further capacity expansion under the next mid-term management plan
- We will flexibly meet growing demand by considering options such as using available space at other sites and outsourcing production to external partners, while anticipating changes in the business environment.



20

As we continue to steadily increase our capacity, and although we are still in the middle of our current medium-term plan, looking ahead to the next medium-term plan, our company currently operates four facilities: Eniwa, Tome, Kanuma, and our headquarters and Tochigi facility. Since the scales are all different, it's impossible to compare them at the same size, but there's still room for growth in each case. While anticipating future changes in the business environment, we intend to respond flexibly to increased demand, whether through in-house production or by outsourcing production to external partners.

## 1. InP Substrate Procurement – Our Position in the Optical Semiconductor Business



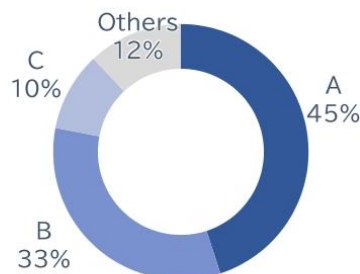
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Next, the position of our company.

As a photodiode manufacturer shown in the middle of the page, Dexerials receives the wafer with the epitaxial layer already formed from an epitaxial processing manufacturer, then creates electrodes on top of them, performs photolithography and etching, singulates the wafers, manufactures photodiodes, and delivers them to optical transceiver manufacturers. The structure is such that substrate supplier receive orders from epitaxial wafer supplier and then deliver the products.

## 1. InP Substrate Procurement – Our Assessment of Current Market Conditions

- **Supply shortage (supply-demand imbalance)**
  - The global InP substrate market is estimated at approximately USD 220 million in 2026.  
\*Only a few percent of the silicon substrate market, which exceeds USD 10 billion
  - The market is expected to grow at a CAGR of approximately 11–12% over the next 10 years.  
The market size is projected to reach approximately USD 600–700 million in 2036.
- **The top three suppliers account for 70–80% of the market**
- **Technical complexity and high entry barriers limit rapid capacity expansion**



Note: We estimate these figures based on various market data and industry reports



Hard, brittle InP requires specialized processing expertise and equipment.

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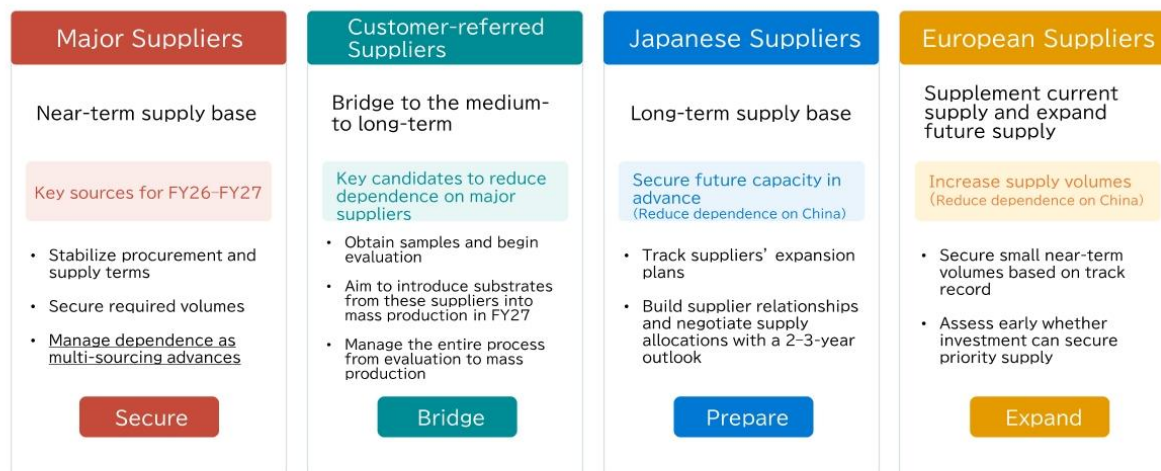
With regard to the procurement of indium phosphide substrates, we recognize that, overall, there is an imbalance between supply and demand. The industry as a whole is unable to keep up with the demand for substrate.

As I explained below, the top three companies account for 70% to 80% of the market share, and each has announced investments to expand capacity. We expect that these capacity expansions will begin to contribute to market supply within the next two or three years.

Indium phosphide wafers can be difficult to manufacture, and the barriers to entry are high. Furthermore, while indium phosphide photodiodes and lasers were niche products until very recently, they have been gaining significant attention lately. We recognize that increasing supply capacity across the entire supply chain requires not only expanding our own production capacity but also collaborating on the materials side.

## 1. InP Substrate Procurement – Our Medium- to Long-Term Procurement Strategy

Minimize near-term shortages, introduce an alternative source into mass production in FY27, and establish a robust multi-source supply base from FY28 onward

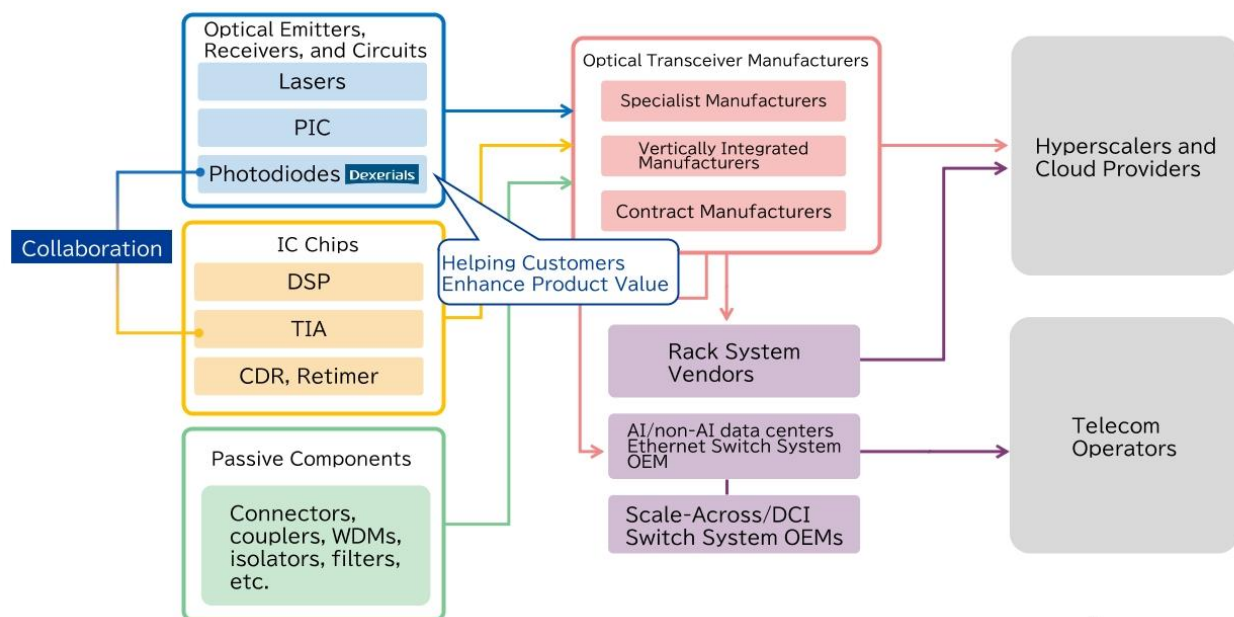


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While the investment in capacity expansion by indium phosphide substrate manufacturers is expected to yield results in about two or three years, regarding what we should do in the meantime, I would like you to view this not as a single approach but as four distinct groups.

We would like to proceed by clarifying the positioning of each group and how we plan to use them, setting priorities accordingly, and acquiring the products from them as multiple sources as they become available. We are not just negotiating with substrate manufacturers but are receiving referrals and advice from our customers and consulting with them directly as we work to figure out how to weather the next two or three years until industry capacity increases. Since the customer understands the situation, if we switch to a multi-source system, we'll be required to obtain PCN certification for each product of customers individually, as the raw materials differ. Customers also want to proceed with authentication quickly, and we are working with them to complete the authentication process.

## 1. Business Expansion: Creating Value for Customers



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Next, we'll discuss our business expansion initiatives.

So far, I have explained our production capacity and indium phosphide procurement; from here on, I'll discuss value creation. We are positioned where it says PD in the supply chain. We deliver the product to the optical transceiver manufacturer, who then delivers it to the hyperscaler. In addition to the transmitter and receiver circuits of an optical transceiver, it consists of various components such as a DSP, TIA, and CDR, as well as passive components like couplers and connectors. It can be quite difficult to improve performance by relying solely on PDs, that is, photodiodes, alone. We are currently working on a collaboration with a TIA manufacturer.

## 1. Business Expansion: Creating Value for Customers

### Our Competitive Advantages

- High-Sensitivity, Low-Noise Technology
- High reliability and a long track record
- Inorganic thin-film processes and optical design expertise
- Design-in
- One of a limited number of InP PD suppliers

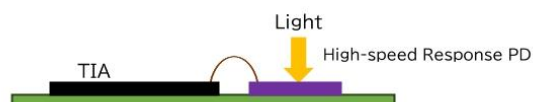
### \*Low BER (Bit Error Rate)

Example: Compare transmitted and received bit sequences

|         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tx bits | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| Rx bits | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |

Errors  $N_e = 3$ , total bits  $N_t = 20 \rightarrow \text{BER} = N_e/N_t = 0.15$

Electrical signals are generated through the following process:  
Light  $\rightarrow$  High-speed Response PD  $\rightarrow$  TIA  
Further improvements in BER require collaboration.



\*BER (Bit Error Rate): The ratio of incorrectly received bits to all transmitted bits. Many optical systems require physical-layer BER  $10^{-9}$  or lower (one error per billion bits), and ultra-high-speed systems  $10^{-12}$  or lower.

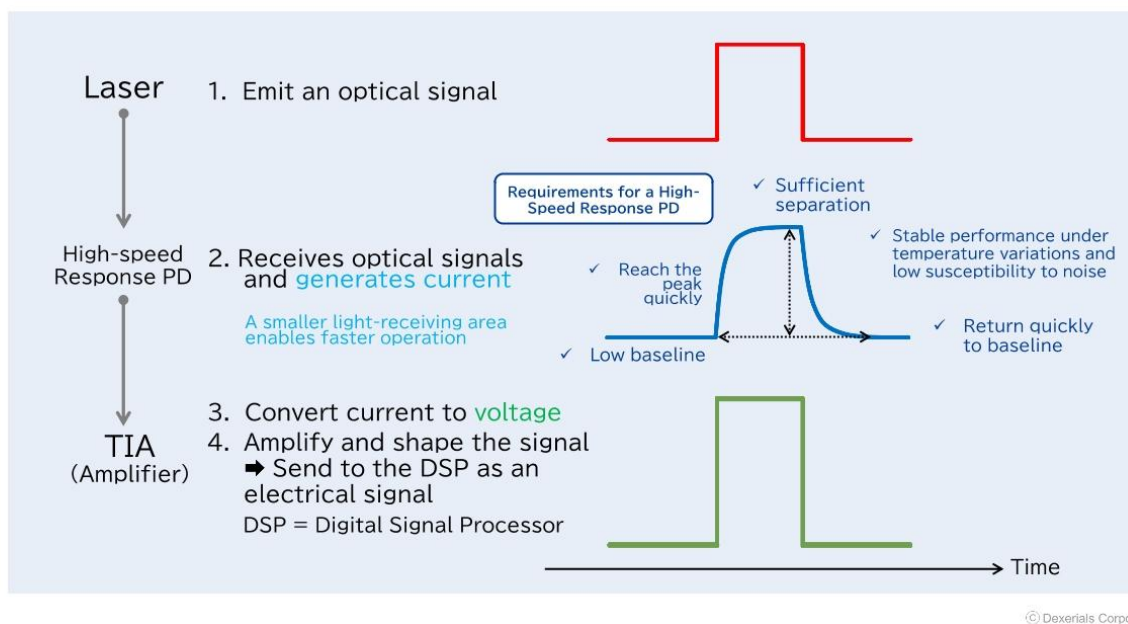
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As for what makes Dexerials' photodiodes so good in the first place, we've highlighted various aspects of our optical design technology and engineering, such as high sensitivity, low noise, and high reliability.

To put it simply, since it is an optical transceiver, the fact that there are few errors or inaccuracies in the actual received signal is a major advantage. Since a massive amount of data is being transmitted, and since it is raw data, corrections cannot be made. In this regard, it's important to receive the data correctly in the first place to avoid mistakes.

"BER" stands for Bit Error Rate, which refers to the difference between the signal actually sent by the transmitter and how it was interpreted by the receiver. Since three reds appear here, that means it's wrong. If three of these numbers are wrong, I don't think it will work. In reality, the error rate is about one error per gigabit, but depending on the application, the requirements can be as much as 1,000 times more stringent.

## 1. Business Expansion: Optical-to-Electrical Signal Conversion



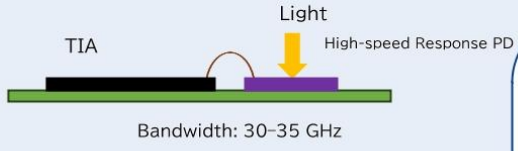
Light is emitted from the laser, detected by a high-speed response PD, and then processed by a TIA. As I mentioned earlier, I'll now explain that process in more detail.

First, when the laser emits light in pulses, the high-speed response PD detects the light, and the InP photodiode generates a current. When optical signals reach the peak above the baseline, and when the light goes out, it quickly returns to the baseline. The higher the sensitivity, the better the device can capture sufficient peaks even in low-light conditions. If the sensitivity is low, you have to shine a pretty intense light on it to get a peak—that's how it is with silicon germanium. The criteria for a good high-speed response PD are, first, that the baseline is low and stable; second, that it quickly reaches a peak when light is present, with a sufficient difference in height from the baseline; and third, that it quickly returns to the baseline once the light is turned off. These five characteristics, which are resistance to temperature changes and noise, as well as robustness against external disturbances, are the criteria for a high-speed response PD. We've received feedback from our customers that this aspect performs well.

Basic digital electrical signals are voltage. Since a photodiode outputs current, the TIA first converts it into a voltage. Since the amplifier comes next, the TIA is responsible for amplifying the signal and shaping the waveform.

## 1. Business Expansion: Transition from 100G to 200G High-Speed Response PDs and Advances in Mounting Methods

- 100G/lane = Wire bonding (Copper wiring)



The diagram shows a green substrate with a black TIA and a purple High-speed Response PD. A red wire connects the TIA to the PD. A yellow arrow labeled 'Light' points down at the PD. Below the diagram, it says 'Bandwidth: 30-35 GHz'.

### Benefits of Collaboration

- ✓ Enables joint performance evaluation of next-generation products (An advantage in expanding our customer base)
- ✓ Particularly beneficial for differentiation in BER (bit error rate)
- ✓ Enables bonding interface information to be incorporated into our design specifications in advance
- ✓ Available only to collaboration partners (limits competitors' access)

- 200G/lane = PD on TIA  
Shorter interconnects support faster speeds



The diagram shows a green substrate with a black TIA and a purple High-speed Response PD mounted directly on top of it. A yellow arrow labeled 'Light' points down at the PD. Below the diagram, it says 'Bandwidth: 60-70 GHz'.

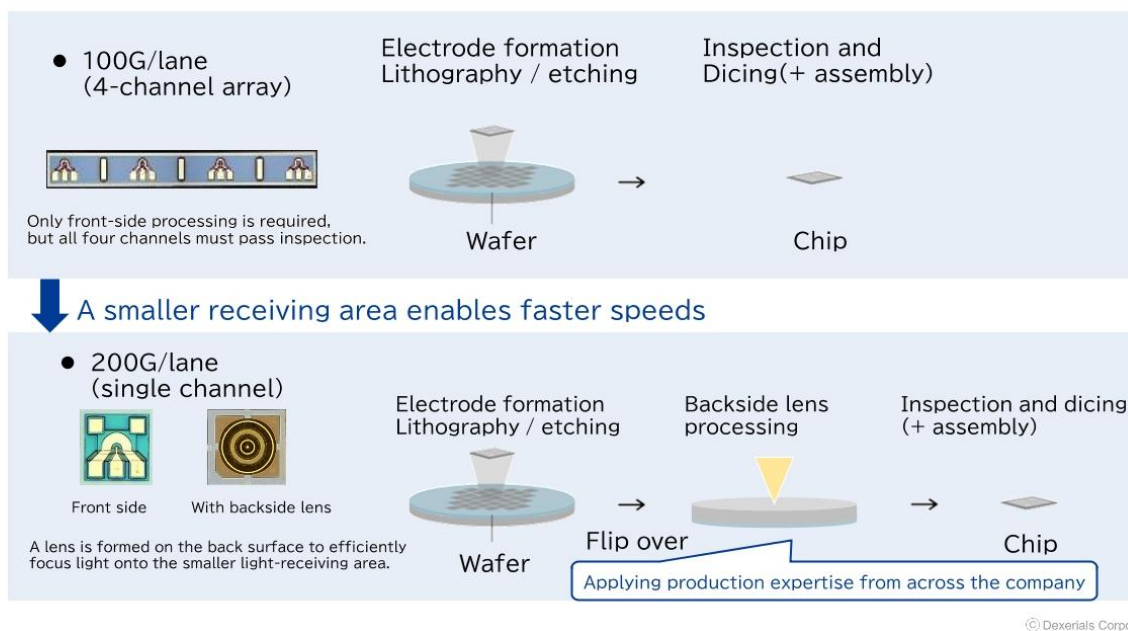
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As for the TIA, on the 100 G/lane, there is a photodiode on the green substrate, with the TIA next to it, and they are connected via wire bonding. The bandwidth is 30 GHz –35 GHz and is extremely fast. I think CPUs and the like run at around 5 GHz, so this is running at more than seven times that speed. With 100 Gbps, this is still manageable, but at 200 Gbps, signal loss occurs while the signal is being transmitted via wire bonding to the TIA. The mounting method changes as photodiode is mounted directly on top of the TIA. The bandwidth is also 60 GHz –70 GHz, which is extremely wide.

The significance of collaborating with TIA manufacturers lies in the fact that, even if we try to achieve high performance with photodiodes alone, it is the TIA that makes it possible. Furthermore, since photodiodes are mounted on top of the TIA, if we don't know the connection pattern for the electrical signals in advance, we won't know where to place the electrodes when manufacturing the photodiodes. In that sense, there is the advantage of being able to incorporate the joint locations into our design specifications in advance; this allows for an early comprehensive evaluation of next-generation products. Additionally, the low BER—a key advantage of our photodiodes—also contributes to their compatibility with TIAs. We'll also have time to fine-tune that in advance.

Finally, as you would expect, TIA manufacturers offer benefits to the vendors they collaborate with. For organizations that are not participating in the collaboration, this means that such mutual verification will not be possible. In this regard as well, the benefits of collaboration are significant. With just 100 Gbps, the TIA is installed right next to each other, almost like neighbors, so we didn't really need to go that far. However, with 200 Gbps, since we install our PD on top of TIA, it is the advantage that we can work closely.

## 1. Business Expansion: 100G/lane vs. 200G/lane PDs

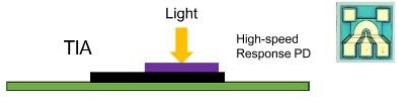
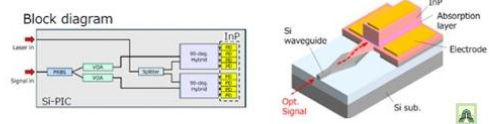


I've explained the differences in implementation between the 100 Gbps and 200 Gbps models, but I'd also like to briefly explain the other differences between them.

This product comes in four patterns and combines four channels into one. Here, electrodes and other components are actually formed on the top surface of the wafer, and the process is completed after the wafers are separated into individual pieces. As for the 200 Gbps version, while the process of forming electrodes on the front surface, performing lithography, and etching is the same, a lens must be attached to the back surface, so an additional back-side process is required.

The reason for attaching a lens is that photodiodes have the characteristic of operating faster the smaller their light-receiving area is. If the opening is too small, light may not enter properly; by attaching a lens to the surface, the lens guides the light to the actual light-receiving area even if the position is slightly off, so the lens is attached to the back side. Here, too, the back side is made of indium phosphide itself, but since it is transparent to infrared light, light passes through it, and an anti-reflective coating is also applied to the front surface. From a production standpoint, the front surface is the same, so that's fine, but the process of machining the lens on the back side is where the real challenge lies.

## 1. Next-generation High-speed Response PDs: Higher Speeds for Existing PDs + Innovation through New-Generation Technologies

|                     | Scale-Out                                                                                                                                              | Scale-Across                                                                                                                                                   |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Timing              | Ramp-up: from 2028<br>Mass production: from 2029<br><small>Depends on progress in 400G/lane PD development<br/>(Also subject to market demand)</small> | Ramp-up: from 2029<br>Mass production: from 2030<br><small>InP High-speed Response PDs will be essential<br/>(SiGe initially, then InP as speeds rise)</small> |
| Application         | 3.2T optical transceivers                                                                                                                              | 3.2T optical transceivers                                                                                                                                      |
| Receiving Structure | InP backside lens                                                                                                                                      | InP waveguide<br>(silicon photonics + heterogeneous InP integration)                                                                                           |
| Assembly Method     |  <p>Active alignment<br/>PD on TIA, as with 200G</p>                  |  <p>Passive alignment<br/>Self-alignment using positioning structures</p>    |
| Bandwidth           | 80-95 GHz                                                                                                                                              | 90-110 GHz                                                                                                                                                     |
| Our Initiatives     | Back-illuminated 400G/lane PDs: Prototype development under consideration                                                                              | Waveguide 400G/lane PDs: Under development<br>PICs for silicon photonics: Under development                                                                    |

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It was 100 Gbps and 200 Gbps, but next it will be 400 Gbps.

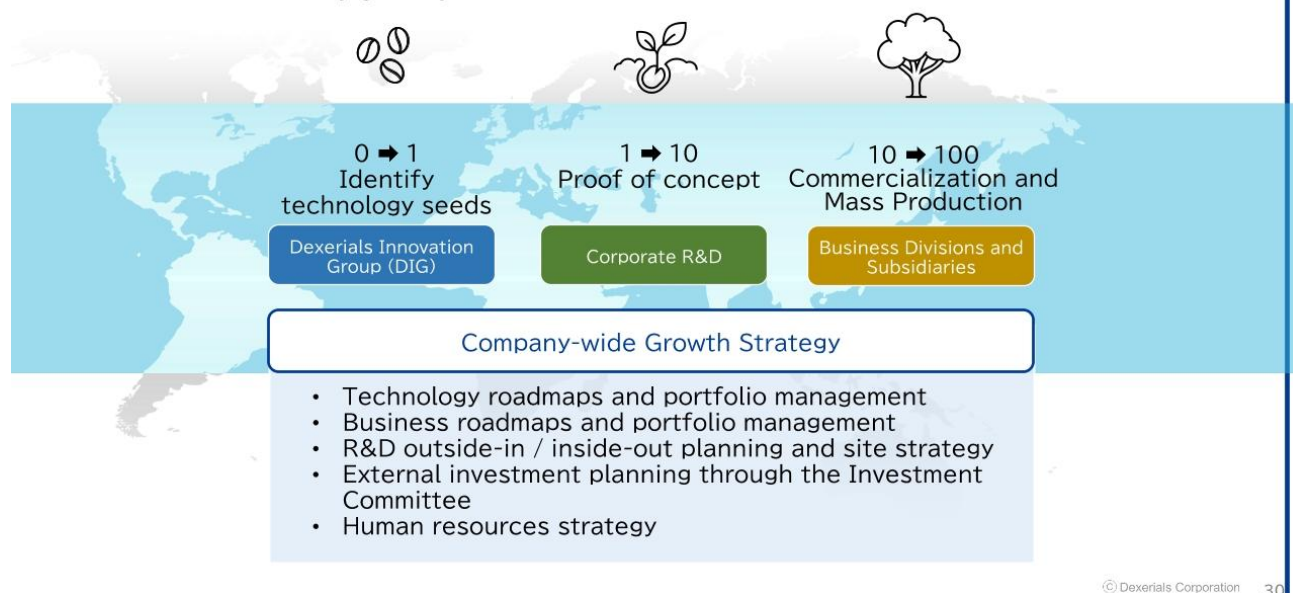
When it comes to 400 Gbps, there is also a method, similar to the one described above, that involves mounting a photodiode on top of the TIA. We plan to launch this product in 2028 and start mass production in 2029. Given how rapidly the world is changing, and with the 200 Gbps product just about to launch, we'll be keeping a close eye on market conditions and other factors to determine whether there will be demand for the 400 Gbps product when it launches in two years.

It looks as though the approach changed abruptly on the right side, but the right side features a circuit design known as silicon photonics. In the photo on the far right, there's something mysterious shown. That's an indium-phosphide photodiode. In this case, the device consists of an optical circuit known as silicon photonics, along with modulators and various other chips; it is realized through a heterogeneous InP integration in which an indium phosphide photodetector is attached to it.

This involves some very challenging technology, and it also states that it will be implemented between 2029 and 2030. Ideally, we would like to follow that timeline, but as far as we're concerned, regarding the 400 Gbps, specifically the two types listed on the right, the Back-illuminated type and the waveguide type, we are actively developing both within our development pipeline and proceeding with this in preparation for future demand.

## 1. From Next-Generation Standalone PDs to Solutions: Our Value Creation Framework

Photonics business growth is the top priority in our company-wide growth strategy, with activities underway globally.



So far, I've explained the 100 Gbps, 200 Gbps, and 400 Gbps High-Speed response PD options. Given the extremely fast pace of change in the world and the large-scale investments being made by hyperscalers, we established the Dexerials Innovation Group in 2021 to serve as a value creation framework, one that operates on a global scale rather than just within Japan, for identifying seeds, conducting proof-of-concept testing, and moving toward product commercialization and mass production.

We have been actively engaged in the field of photonics through an internal framework that involves identifying "0 to 1" opportunities for R&D, having R&D turn that "1" into "10" through proof-of-concept, and then having business divisions and subsidiaries take it from "10" to "100" through product commercialization and mass production. While there will naturally be changes in how we anticipate future trends, we are moving forward with product development by closely tracking those trends.

## 1. High-speed Response PDs: Our Development Roadmap



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As for high-speed response PDs, we first began selling a 100G/lane, four-channel model last year. We are currently preparing to launch 200G/lane. Looking even further ahead to the next generation, we have the 400G/lane version. There are two types available. We are developing our products in a way that allows us to flexibly accommodate the specific assembly methods each customer chooses to use. Ultimately, we aim to offer our customers a complete solution consisting of a product that integrates an indium phosphide optical detector onto a silicon photonics substrate.

Prior to that, we also plan to launch an all-silicon PIC that does not use an indium-phosphide waveguide PD. This is silicon photonics using what is commonly known as silicon germanium. Since we can't jump straight to integrating silicon photonics with indium phosphide, we're proceeding with a two-step development approach: first, we'll thoroughly master all-silicon photonics on our own, and then, as the next step, we'll integrate indium phosphide to prepare for future speed improvements.

## 2. Edge-illuminated Monitor PDs

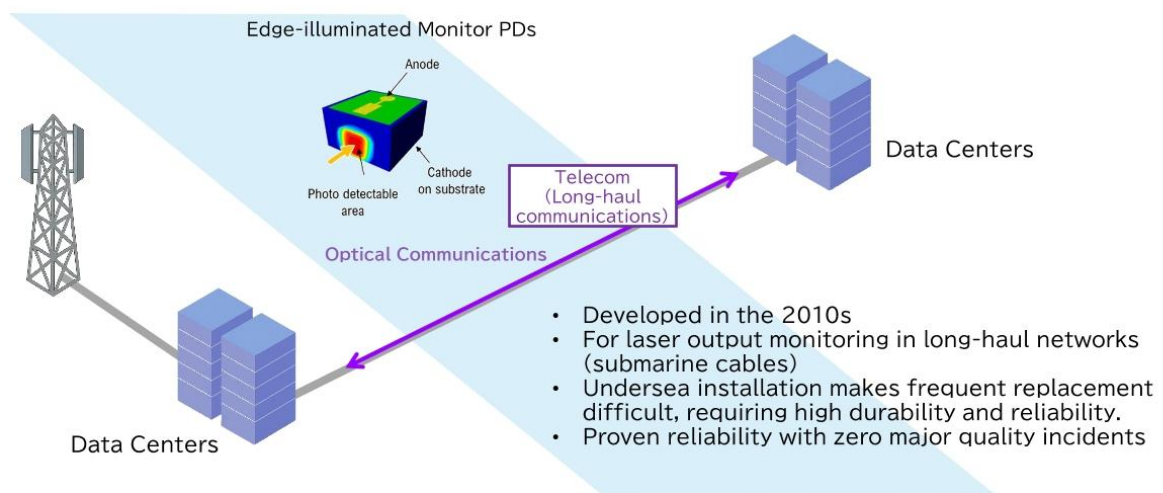
- Business Expansion initiatives: Maximize sales opportunities with chip sizes tailored to laser light source use cases

| Product Group | 1. High-speed Response PDs                                                                                                                                                                                                            |                                                                                                            | 2. Edge-illuminated Monitor PDs                                                                                                                                                   | 3. Monitor PDs and Assemblies                                                                                                                                     |                                                                                                                                                                                               |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product       | High-speed Response PD chips                                                                                                                                                                                                          | High-speed Response PD assemblies                                                                          | Edge-illuminated monitor PD chips                                                                                                                                                 | Surface-illuminated monitor PD chips                                                                                                                              | Mini-can packages and assemblies                                                                                                                                                              |
| Form          | 100G/lane (4-channel array)<br>200G/lane (single channel)<br>                                                                                        | CoC (Chip on Carrier)<br> |                                                                                                 | Front side<br>                                                                 |                                                                                                            |
| Use Features  | <ul style="list-style-type: none"> <li>Optical transceivers for high-speed communications within data centers</li> <li>Optical signal reception with ultra-high-speed response</li> <li>Designs tailored to customer needs</li> </ul> |                                                                                                            | <ul style="list-style-type: none"> <li>Can be placed coaxially with the laser</li> <li>Real-time optical power monitoring</li> <li>Products tailored to customer needs</li> </ul> | <ul style="list-style-type: none"> <li>Low dark current / low capacitance</li> <li>Real-time optical power monitoring</li> <li>Customization available</li> </ul> | <ul style="list-style-type: none"> <li>Sealed packages for long-term reliability</li> <li>Compatible with various standard connectors</li> <li>Products tailored to customer needs</li> </ul> |
| Use Cases     | Scale-Out                                                                                                                                                                                                                             | Scale-Across                                                                                               | Scale-Out                                                                                                                                                                         | Scale-Across                                                                                                                                                      | Scale-Across                                                                                                                                                                                  |

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From this point on, I will explain the details regarding edge-illuminated monitor PDs.

## 2. Edge-illuminated Monitor PDs: Product Origins



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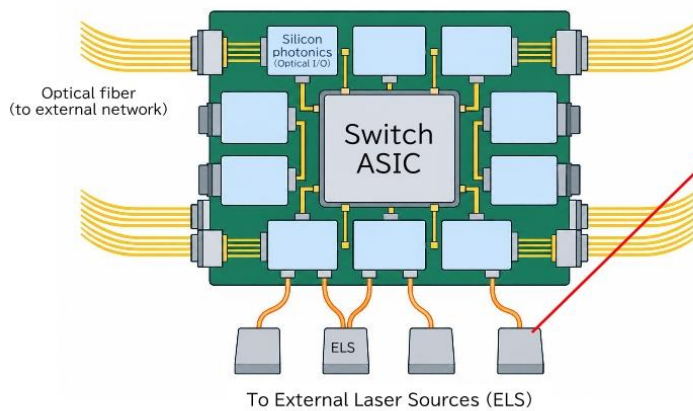
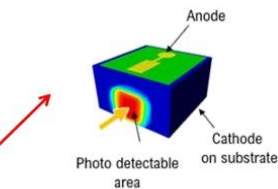
For edge-illuminated monitor PDs, while previous models received light from either the top or the back, this photodiode receives light from the side to monitor the laser output. Originally designed to monitor the laser output of telecom submarine cables, these devices are installed on the seafloor, making replacement difficult; therefore, they must be rugged and highly reliable. We have been selling this product to our telecom customers since the 2010s. It boasts a record of zero major quality incidents—perhaps I should say it's a product we're proud of, or rather, a product Kyoto Semiconductor is proud of—but in any case, it's a product with a long history.

## 2. Edge-illuminated Monitor PDs: New Applications

Selected for use in next-generation optical network switches due to its high durability and reliability

CPO (Co-Packaged Optics): Simplified Architecture

Adopted as monitor PDs for ELS (External Laser Sources)



Current:  $450 \times 450 \mu\text{m}$

Smaller chip (medium)

Smaller chip (small)

Expanding the lineup to meet customer needs  
Preparing to increase production to meet growing demand

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The qualities that have made these submarine cables so successful, such as their high durability and reliability, are also evident in this schematic diagram of a complex optical network switch known as a CPO, which is essentially similar to a LAN router. This device receives fiber-optic cables from various locations, switches the data there, and distributes it to different destinations. With these many optical fibers converging here and transmitting optical signals, the monitor PD used to monitor the laser output must also be robust. If even one of them breaks, the whole thing is ruined. Of course, removable types have been developed recently, and it seems that repairable versions are also being proposed. While our products are already recognized by customers for their high durability and reliability, the emergence of CPO technology has led to a shift toward using rugged solutions designed for the telecom industry; as a result, our products have been adopted as photodiodes (PDs) for monitoring external laser sources.

Because it is built to be sturdy, it is slightly on the large side, measuring 450 microns on each side. While we are proposing designs, including smaller sizes, that are easier for our customers to use, we are also making preparations at our Eniwa Operation to increase production in order to meet future demand. A 450-micron square is about the same size as a single grain of granulated sugar.

### 3. Monitor PDs and Assemblies

- Profit growth initiatives: Cost reduction and productivity improvements to support sales growth in Scale-Across and Scale-Out

| Product Group | 1. High-speed Response PDs                                                                                                                                                                                                            |                                   | 2. Edge-illuminated Monitor PDs                                                                                                                                                   | 3. Monitor PDs and Assemblies                                                                                                                                     |                                                                                                                                                                                               |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product       | High-speed Response PD chips                                                                                                                                                                                                          | High-speed Response PD assemblies | Edge-illuminated monitor PD chips                                                                                                                                                 | Surface-illuminated monitor PD chips                                                                                                                              | Mini-can packages and assemblies                                                                                                                                                              |
| Form          | 100G/lane (4-channel array)<br>200G/lane (single channel)                                                                                                                                                                             | CoC (Chip on Carrier)             | Aside<br>Photo-detectable area<br>Cathode on substrate                                                                                                                            | Front side                                                                                                                                                        |                                                                                                                                                                                               |
| Use Features  | <ul style="list-style-type: none"> <li>Optical transceivers for high-speed communications within data centers</li> <li>Optical signal reception with ultra-high-speed response</li> <li>Designs tailored to customer needs</li> </ul> |                                   | <ul style="list-style-type: none"> <li>Can be placed coaxially with the laser</li> <li>Real-time optical power monitoring</li> <li>Products tailored to customer needs</li> </ul> | <ul style="list-style-type: none"> <li>Low dark current / low capacitance</li> <li>Real-time optical power monitoring</li> <li>Customization available</li> </ul> | <ul style="list-style-type: none"> <li>Sealed packages for long-term reliability</li> <li>Compatible with various standard connectors</li> <li>Products tailored to customer needs</li> </ul> |
| Use Cases     | Scale-Out<br>Scale-Across                                                                                                                                                                                                             | Scale-Across                      | Scale-Out                                                                                                                                                                         | Scale-Across                                                                                                                                                      | Scale-Across                                                                                                                                                                                  |

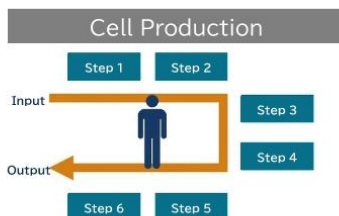
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Finally, this is monitor PDs and assemblies, which is a surface-illuminated type.

### 3. Monitor PDs and Assemblies: Production Innovation for Scale-Across Growth

Mainly telecom and factory automation equipment (stable long term, with limited growth)

High-mix, low-volume production, including semi-custom products



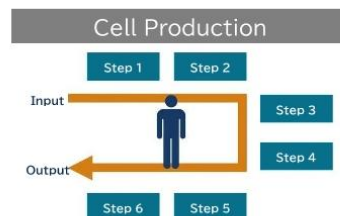
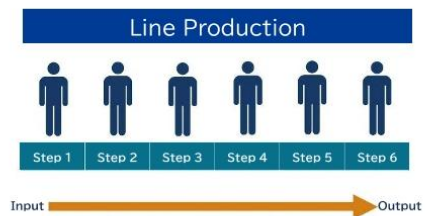
Expansion into major accounts and high-volume markets (Entering datacom to drive growth)

High-volume production for global customers

Higher production efficiency

Shift high-volume products to line production

Improve both production efficiency and capacity to respond quickly to customer orders



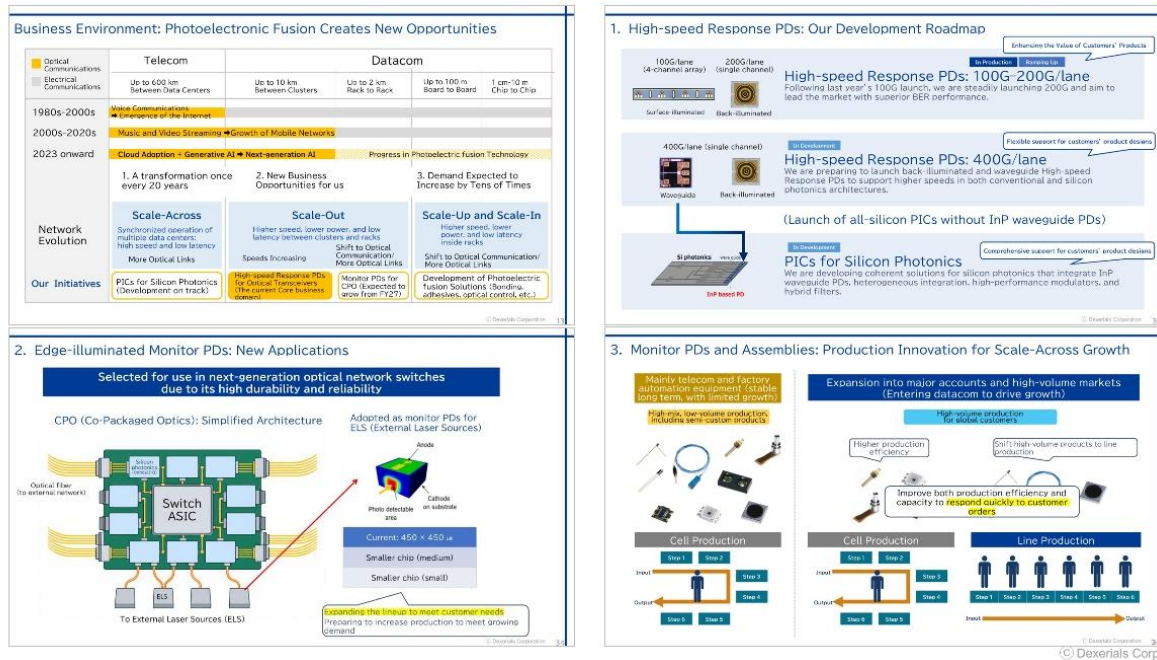
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For this monitor PDs, as well as high-speed PDs, since it is primarily intended for telecom and factory automation equipment, which involves small quantities and a wide variety of products, we have long relied on a cell production system. One person created it from start to finish. In reality, when entering the data communications market and trying to reach top customers and the mass market, it's quite difficult to do so. Even though I've only outlined steps 1 through 6 from start to finish, it's believed that there are actually 50 or even 100 steps involved. Under those circumstances, if you work on a single product from start to finish, it takes a considerable amount of time just to learn how to do it. By organizing the process into a production

line, it's possible to make it work as long as you acquire the skills needed only for the specific steps you're responsible for.

For high-volume items, we use an assembly line production system, and for others, a cell production system; we are actively pursuing significant production innovations in this area at the Eniwa Operation as well. Specifically, regarding the Tome Operation, we have established a new optical semiconductor production line; in this case as well, we followed a process of designing an ideal line from scratch with the goal of creating a more efficient production line.

## Photonics Business Briefing Summary – Value Creation and Business Expansion



Although the business environment is undergoing a once-in-two-decades transformation and is marked by highly dynamic shifts in technological trends, we intend to continue expanding and growing our business, first through our sales of high-speed response PD for communications, and also through next-generation products such as CPO, via our monitor PD sales.

## Photonics Business Briefing Summary – Value Creation and Business Expansion

| Our Products                                                                                 | Application                                | Representative Products and Products in Development                                                                          | Laser Source | Scale-Up<br>Up to 10 m | Scale-Out<br>10 m-10 km | Scale-Across<br>10 km-100 km | Long-Haul<br>600 km-<br>1,000 km |
|----------------------------------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|--------------|------------------------|-------------------------|------------------------------|----------------------------------|
| Development of Photoelectric Fusion Solutions<br>(Bonding, Adhesives, Optical Control, etc.) |                                            |                                                                                                                              |              | ●                      | ●                       | ●                            |                                  |
| 2. Edge-illuminated Monitor PDs                                                              | Network Switch ELS(External Laser Sources) | Edge-illuminated Monitor PDs                | DFB          |                        | ●                       |                              |                                  |
| 1. High-speed Response PDs                                                                   | 800G Optical Transceiver                   | 100G/lane PDs                               | EML          |                        | ●                       |                              |                                  |
|                                                                                              | 1.6T / 800G Optical Transceiver            | 200G/lane PDs                               |              |                        | ●                       | ●                            |                                  |
|                                                                                              | 3.2T / 6.4T Optical Transceiver            | 400G/lane PDs Waveguide PD                  |              |                        | ●                       | ●                            |                                  |
|                                                                                              | DCI Optical Transceiver                    | 800G ZR PIC (All SiPh) 1.6T ZR PIC (H-PIC)  | ITLA         |                        |                         | ●                            |                                  |
| 3. Monitor PDs and Assemblies                                                                | Multi-Rail EDFA                            | Surface-illuminated Monitor PDs/Assemblies  | ITLA         |                        |                         | ●                            |                                  |
| 2. Edge-illuminated Monitor PDs                                                              | Cable Repeater                             | Edge-illuminated Monitor PDs                | Pump         |                        |                         |                              | ●                                |

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I'll skip this part since it's a bit technical, but the techniques used vary depending on the distance. As for that coverage, we have monitor PDs and high-speed response PDs for medium- and long-range applications. Including short-range applications, and optical transceivers are no exception, these components are typically mounted in fairly large enclosures, and for a long time, we have been supplying materials for modules designed for smartphones. We believe there is still significant room for further miniaturization and efficiency improvements. In this regard, we intend to leverage our optical bonding technology, which goes beyond just high-speed response PD, as well as our batch mounting technology to develop solutions for photoelectric integration. We plan to explore future solutions for not just photodiodes and monitor PDs by the time our next mid-term management plan is released, and we hope that one day we'll be able to explain them to you all.

That concludes my explanation. I know I had to rush through it a bit, but I hope this suffices. Thank you for your attention.

## Question & Answer

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**Moderator [M]:** We will now move to the question-and-answer session. For the question-and-answer session, we will first give priority to questions from attendees at the venue, followed by verbal questions from participants joining via Zoom Webinar. Please note that we may not be able to answer all questions due to time constraints. Please understand this in advance. Now, let's begin with the audience members here today.

**Yamada [Q]:** Thank you very much for your explanation. This is Yamada from Mizuho Securities. There are a few basic points I don't understand, so I would like to have an explanation on them first. It says "four-channel array at 100Gbps/lane," but does this mean that, in the case of digital coherent optical communication, where there are the Q and I components and also plus or minus, and the data is transmitted at a rate of 4 bits per clock cycle, four channels are required, or is that not the case?

It was set to one channel at 200 Gbps, but I believe the "4 bits in one clock" for digital coherent transmission is the same. Why is that? Are you assuming a digital coherent optical communication system that operates at less than 100 GHz at 400 Gbps and does not use 4 bits per clock?

Also, in digital coherent systems, the four signals are received at separate locations. Is the differentiation here based on your company's processing rather than on epitaxial growth? Please also tell me about factors for differentiation. Thank you.

**Kinoshita [A]:** I, Kinoshita, will respond first. First, 100Gbps/lane equates to 400 Gbps per second; this specification divides 400 Gbps per second across four lanes. Four lasers are required, and four photodetectors are needed. This means that each photodetector, each photodiode, has a reception capacity of 100 Gbps. Since 200Gbps/lane means both the laser and the receiving end are 200 Gbps, having four of them results in 800 Gbps.

This might be a bit off-topic, but the 1.6 Tbps is just starting up now and will be fully operational in 2028. It's said that configurations using eight 200Gbps/lane modules will become the norm there. Looking ahead, we are planning to increase the capacity of each lane to 400 Gbps, make the lasers faster, and increase the speed of the receiving end as well.

**Yamada [Q]:** When the speed is 400Gbps/lane, your company's bandwidth falls below 100 GHz. Is that because the amount of information that can be transmitted per clock cycle increases? Since it's per lane, it's coming at 400 Gbit per second per lane. Is that right?

**Kinoshita [A]:** That's right.

**Yamada [Q]:** Assuming a clock frequency of 90 GHz, with the current digital coherent optical communication system transmitting 4 bits per cycle using Q and I components, and plus and minus, since the total is  $2 \times 2$ , or 4 bits per clock cycle, it seems to me that 400 Gbit per second cannot be achieved. Why is it possible? Is it because you'll be able to perform coherent communication using more complex techniques, such as phase modulation? In this context, is the source of added value primarily the epitaxial growth process, or does your company's machining of the parts play a larger role?

**Kinoshita [A]:** That's a very technical question. As you say, the wider the bandwidth, the better, but when we actually manufacture photodiodes, we don't pay that much attention to bandwidth. To improve light-receiving performance, we manufacture these products with careful attention to various capacitance values and sensitivity levels. It's not just about being fast; performance that minimizes noise, such as dark current, is

also required. Working in collaboration with epitaxial manufacturers, we take a comprehensive approach that encompasses everything from epitaxial design and growth to the design of the photodiodes themselves.

**Yamada [Q]:** In that case, epitaxial growth is the first step in creating added value, but since your company sets the specifications based on the type of photodiode you want to manufacture, it seems like both processes share in the added value. Doesn't that mean we can't simply say that epitaxial growth is the most important factor?

**Kinoshita [A]:** You're absolutely right. As for the epitaxial, we'll provide our recommendations on the desired specifications, and of course, the manufacturer has its own expertise as well. However, it's not about excelling in just one area; rather, a well-rounded set of skills is required.

**Yamada [Q]:** Thank you. I have one more question. Based on what we've discussed, I'd like to ask about your company's current and future competitive advantages and barriers to entry. While your company is currently highly regarded for its reliability, I believe this is likely due to the extremely high precision of your shaping and machining processes, as well as the fact that you've established excellent information-sharing with epitaxial wafer manufacturers. I assume your company's expertise is what enables such high machining precision, but isn't there a risk that sharing information with Epiwafer manufacturers could lead to them releasing it elsewhere? Is the high level of manufacturing precision something that can be caught up with to a certain extent by investing time and manpower, or is there significant intellectual property involved that makes it difficult to resolve easily? This is a basic question, but could you please explain it to me?

**Kinoshita [A]:** There are various areas of expertise, in development as well as in production, and while it's difficult to pinpoint just one specific aspect, our expertise lies primarily in development centered on indium phosphide. The first pillar is to improve signal quality. We have such talent within our company, but since this industry advances so rapidly, we will collaborate with academia and industry professionals as needed. It all began when Dexerials acquired a company specializing in optical semiconductors, but Dexerials' various chemical material processing technologies, such as the technology for bonding silicon and compound semiconductors, are technologies that Dexerials originally possessed.

By combining various elements, including, of course, the products themselves and their performance, and given that this is a market experiencing significant growth, we are working on this while also focusing on manufacturing efficiently.

**Yamada [Q]:** Regarding the second half of your presentation, where you mentioned combining this with your company's other technologies, are you referring to things like the fact that you can manufacture silicon photonics to a certain extent yourselves, or that you can produce inorganic modulators and thus apply them to the manufacture of Mach-Zehnder modulators, or that you have optical adhesives that allow you to match the refractive index?

**Kinoshita [A]:** Please understand that we utilize a variety of fundamental techniques in our work. While this is not limited to our company, I will first base my answer on the fact that we have such techniques internally.

**Yamada [Q]:** When collaborating with external parties, do you have a framework in place to prevent knowledge leakage? In other words, is there a system to ensure that proprietary know-how does not inadvertently flow to other parties?

**Kinoshita [A]:** I can't go into detail about that, but since new technologies are constantly emerging, I think one approach is to be very open to learning about them. Then, if there's a discussion about our budget and working together, I'm open to hearing it out, but ultimately, I think it comes down to whether or not we can actually form a solid partnership.

**Yamada [M]:** Thank you.

**Moderator [M]:** Thank you. Now, let's move on to the person next to you.

**Watanabe [Q]:** Thank you. This is Watanabe, SMBC Nikko Securities. First, could you tell us your thoughts on production capacity? I believe it was on page 19 of the presentation, but if we take 2026 as 1, the production capacity of 200 Gbps would be about 3 in 2027. It appears that 2028 is around 6. In response to this, I believe you mentioned the vacant lot at the factory earlier. Does this mean that the existing factory buildings will be sufficient until 2028, but after that you'll have to purchase additional land? Do we really have to consider increasing the number of buildings in Tome with an eye toward 2028? Could you please clarify that point for me?

**Kinoshita [A]:** First, please understand that this diagram is just an illustration. Please think of it as something that allows for expansion as demand grows. However, preparations for the investment are proceeding as planned. We believe that, as things stand, we will be able to handle the production of optical transceivers, for which we currently anticipate the greatest demand, in-house through 2028. However, since this situation changes from day to day, we are currently considering various options and planning ahead as needed.

**Watanabe [Q]:** So, I understand that, for now, your current factory should basically be able to handle up to 200 Gbps. Understood. Thank you.

Second, I'd like to go over the roadmap again. On pages 29 and 31, specifically on page 31: while many 100 Gbps systems use surface-illuminated type with multi-array designs, 200 Gbps systems switch to back-illuminated type, and you will also move forward to lens-equipped configurations. Is it correct to understand that the large-scale production planned through 2028 refers to the back-illuminated, lens-equipped systems shown on the right?

**Kinoshita [A]:** Yes, that's correct.

**Watanabe [Q]:** I understand. What I didn't understand was the 400 Gbps one in the middle. I think the version with a back-illuminated type with lens follows the same principle and is an extension of that. However, based on this diagram of the waveguide type, I believe it's an indium phosphide-based waveguide photodiode. For the bottom one, you mentioned that you will do that for silicon germanium as well. Could you please clarify about the one on the left side in the middle and the one at the bottom?

**Kinoshita [A]:** The waveguide type is, first of all, in the center. We're opting for a waveguide design because it delivers high performance, but since we're manufacturing large volumes for a very large market, market demands also call for an implementation similar to the current 200G/lane design. When developing an entirely new technology, we have to produce a large number of units. Therefore, we are developing a waveguide-type device with back-illuminated type, which is shown in the center.

The technology described below involves mounting a waveguide-type photodiode, with only the light-receiving portion, on a silicon substrate. As I mentioned earlier, one of our strengths is that the compound semiconductors used in our photodetectors offer higher light-detection performance than silicon. That is our strength. However, it is generally said that silicon is resistant to cracking, making it well-suited for manufacturing. The idea is to use silicon to attach the current compound semiconductors to the most critical light-receiving section.

**Watanabe [Q]:** I apologize for being so persistent, but is my understanding correct that the 400 Gbps waveguide type is intended for customers seeking high performance who prioritize sensitivity, and who are willing to accept a back-illuminated type as long as they get a high volume, and that this is essentially an extension of the 200 Gbps model on the right?

**Kinoshita [A]:** First, for the 400 Gbps model, we want the performance of a 400 Gbps drive, but I'd like it to be as similar as possible to the current 200 Gbps implementation.

**Watanabe [Q]:** Are you saying you want to standardize the post-processing steps?

**Kinoshita [A]:** That's right.

**Watanabe [Q]:** I think you need to deliver the same performance, but are they basically the same?

**Kinoshita [A]:** A 400 Gbps waveguide and a back-illuminated waveguide are the same thing.

**Watanabe [Q]:** I see. One more thing. Regarding the roadmap, could you please go back to page 29? Looking at the block diagram on the right, it seems to me that it depicts a coherent system targeting a different market than the one on the left. Based on what you just said, you mentioned that they have the same performance, but it could also be interpreted to mean that you are developing short-range, medium-range, and long-range versions. What are your thoughts on this?

**Kinoshita [A]:** That's correct. To put it briefly, we have also developed systems that use the coherent method.

**Watanabe [Q]:** From a market perspective and for your company, since you're better positioned to leverage your strengths in long-haul applications, I get the impression you're focusing more on the right side of the coherent spectrum. But the reason you're also working on the left side is that indium phosphide will be used even in the high-volume mid-range market at 400 Gbps. Is it correct?

**Kinoshita [A]:** At 400 Gbps, compound semiconductors have a decisive advantage. Even at 200 Gbps, compound semiconductors have an advantage; however, 200 Gbps depends on the transceiver performance. For instance, the distance varies depending on the transceiver. The shorter the distance, the lower the performance required to achieve the same 200G/lane. In reality, even with the same specifications, data center communication distances typically range from as short as about 10 m to as long as about 2 km. At around 2 km, conventional compound semiconductors have a decisive advantage over silicon. Whether it's medium-range or long-range, performance is essential, and I think the light-receiving element will likely be made of a compound, especially for long-range applications. That's what we mainly focus on.

**Watanabe [Q]:** Finally, if possible, I'd like to ask about the competitive landscape. MACOM in the US has announced a photodiode in a similar way, and I think they might be slightly ahead of your company, at least in terms of the timing of their release. Based on today's presentation, it appears that your company is targeting the mid- to long-range market, while MACOM has released a spec catalog for short-range products. I'm wondering if there is any direct overlap between the two. Also, in terms of business model, you have been focusing on solely photodiodes, while MACOM focuses on vertically-integrated model that includes TIAs. Could you please clarify the nature of this competitive relationship?

**Kinoshita [A]:** We call it "Meicom" (for MACOM), but as for photodiodes, we currently offer a similar product at 200G/lane. However, in reality, rather than being in competition, this industry is fundamentally based on multiple sources. I believe we are currently supplying products to several mutual customers. As you said, MACOM has something similar to a TIA. Beyond that, we may take a different approach in the future. For example, by proposing the use of chemical materials in transceiver or by combining them with silicon and using bonding technology to create products with more distinctive features. However, given the market's tremendous growth of the market, although we are competitors, we see each other less as rivals and more as fellow suppliers serving the same customers.

**Watanabe [M]:** Thank you. That is all.

**Moderator [M]:** Thank you. If anyone in the audience has any questions, please raise your hand. Now I would like to move on to questions from Zoom webinar participants.

**Umebayashi [Q]:** I am Umebayashi of Daiwa Securities. I am looking at page 19 of the document. There was a question asked earlier on the same topic and you mentioned that this was strictly just an image. I would like to ask about the capacity written here. I think 2027 will be double the level of 2026, and it will double again after that. I would like to confirm whether this is based on the number of items or the amount of money.

Also, on page 6 of the materials, the sales targets for photonics under the medium-term plan are outlined. The amounts here are in the hundreds of millions of yen. Since this covers the entire photonics business, I understand that sales of inorganic polarizers are also included. However, the ratio of the bar heights differs from the graph shown earlier, so I would appreciate it if you could explain this in a way that ensures consistency.

**Kinoshita [A]:** The capacity graph gives you an idea of the quantity. On the other hand, when it comes to sales value, there are various factors to consider. For example, while the demand for our photodiode products is growing significantly, there are issues such as material procurement and other matters to take into account. This figure represents our production capacity projections based on a variety of factors, taking these constraints into account. So, please feel free to assume that actual demand for our photodiode products is even higher.

**Umebayashi [Q]:** Understood. This is a related question, but I believe the graph you mentioned earlier, which you said is based on quantity, refers exclusively to high-speed response photodiodes. Compared to this high-speed response photodiodes, what is the approximate number of monitor photodiodes being considered?

When it comes to high-speed response PD, 200 Gbps is likely to be more common than 100 Gbps, and since the functionality is, simply put, doubled, I think the unit price will also increase. Given that 200 Gbps products are quite expensive in that price range, could you please elaborate on whether you've factored that into your medium-term sales projections?

**Kinoshita [A]:** I understood. Although we haven't disclosed the specific percentages, the fastest-growing segment is high-speed response PDs for optical transceivers, which, in our terminology, are optical transceivers. The segment of monitor PDs poised for significant growth in the future is the edge-illuminated type using an external laser (ELS). The background to this is that, as applications requiring large amounts of data have emerged, there has been a push to use optical transmission rather than electrical transmission as much as possible for data communication. Initially, this involved using optical transmission between servers with the light of transceiver, but now there is a growing trend toward using optical transmission even within servers, replacing the copper wires previously used for electrical communication with fiber optics for optical communication. As communication between data centers increases, so will long-distance communication, which in turn will lead to an increase in the number of lasers for various reasons. As the number of lasers increases, so does the number of PDs used to accurately monitor the laser light, resulting in a sharp rise in their numbers.

Regardless of the percentage, optical transceivers are the fastest-growing segment. As data centers are built, not only will the number of transceivers increase, but their speed will also increase. Since the number of photodiodes used in each transceivers has also increased, the total number has risen significantly. Furthermore, while traditional long-distance communications are growing at a slower pace in comparison and monitor PDs are also growing slowly. However, as many new data centers are being built, those data centers must be connected to one another, so that segment is also growing, and overall, the market is expanding. I'm sorry I don't have any specific numbers, but that's the general idea.

**Umebayashi [Q]:** Thank you. Is it safe to assume that there is a significant difference in the unit price between the 100 Gbps and 200 Gbps high-speed response photodiodes?

**Kinoshita [A]:** I can't say exactly what the differences are, but the unit prices are different. The 200 Gbps ones costs more per channel.

**Umebayashi [Q]:** I understand. Also, I'm not sure if you'll be able to discuss this, but I believe you're currently working toward mass production of the 200 Gbps model, and the market generally expects that you'll achieve a solid yield rate by the end of the year, with sales likely to begin around Q4. Although it says "as planned," I get the impression that, within the second-half plan, things have shifted slightly from the earlier part to the later part. What are some of the areas that are still posing a bit of a challenge as you work on this project? Is it the part where the lens on the back is made? Or is it somewhere else and it's not something that can be easily explained? Could you please explain this as much as possible, and also let me know again whether you're likely to proceed according to the schedule I mentioned earlier?

**Kinoshita [A]:** The plan for H2 of FY2026 remains completely unchanged. We've finally reached the stage of finalizing the specifications. We will present what we have developed, have our clients evaluate it on their actual devices, and then make a final decision, so please understand that we are currently in the final stage of finalizing the specifications.

**Umebayashi [Q]:** So, if I understand correctly, your company has already pretty much finalized the manufacturing yield and production speed, the levels you consider acceptable, and once the final specifications are approved, you'll be able to run production smoothly?

**Kinoshita [A]:** That's fine.

**Umebayashi [M]:** I see. That is all from me. Thank you.

**Moderator [M]:** Thank you. Well, since we're running out of time, I'll make this the last question.

**Yamada [Q]:** Sorry for the second time. This is Yamada from Mizuho Securities. Early on, there was a discussion about how low latency is different from high speed, and I believe there was a diagram showing many low-latency nodes connected together. Is it correct to understand scale-across as a way to achieve a single spine-leaf architecture across multiple data centers?

In that case, I believe it is said that traffic within data centers accounts for about 70% of total data traffic. Traffic between data centers is also expected to increase exponentially. Is it correct to understand that this will lead to a significant increase in business opportunities due to low latency? Please explain your reasoning.

**Kinoshita [A]:** First, as it says here, I think it would be easier to understand if I gave an example, for instance, regarding low latency. It's often referred to as "physical AI" in the future; autonomous driving requires information to be sent back from the vehicle instantly. This is what low latency is all about. It's a commonly held view that small data centers, known as edge data centers, will proliferate much like cell phone base stations, and from our perspective, this will also lead to an increase in optical communications. I think large data centers will have different application as they process vast amounts of information quickly.

Since it's more physically intensive, low latency is required for real-time operations, whereas when providing services tailored to users based on various types of information, you can simply communicate with large-scale data centers. Though this is just my personal opinion, I consider that to be one example of the differences.

**Yamada [Q]:** Are you referring to connecting the edge and the spine?

**Kinoshita [A]:** As an example, I just talked about low latency and high-speed computing. Ideally, it would be great if all servers were connected in the future, but not all servers will be connected. For example, even if it's a hyperscaler, it might be a different server provider that doesn't connect everything, or it might operate as a closed system in a specific region. I think it depends on the business model. Many people observe that more and more data centers are becoming interconnected over time, but even within the industry, there is currently no clear picture of the timeframe or the specific ways in which this interconnection will take place. I cited them as examples of high speed and low latency in your question.

**Yamada [Q]:** Between 2028 and 2030, what is your company's projected total addressable market (TAM)? Are you envisioning a world where the edge and large-scale data centers are connected via "scale-across," or a scenario where multiple large-scale data centers are interconnected via "scale-across" to form a single, massive spine-leaf architecture?

**Kinoshita [A]:** It's the one where large data centers are connected. If anything, I believe that the "scale-out" segment will see the most significant growth through about 2030.

**Yamada [Q]:** Since that's where the growth will come from, you're thinking that 200 Gbps and 400 GB per lane will be needed, and when multiplied by 8, that could potentially reach 3.2 Tbps?

**Kinoshita [A]:** That's what I think.

**Yamada [M]:** Understood. Thank you.

**Moderator [M]:** Thank you. Since it's time, we will end the question-and-answer session. With that, we will now conclude Photonics Business Briefing Session of Daxx Corporation. Thank you very much for taking time out of your busy schedules to participate in this event.

That is all for the session today. Thank you.

[END]

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### **Document Notes**

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