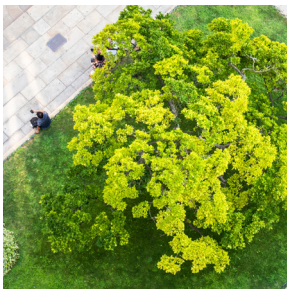
INNOVATING FOR A SUSTAINABLE FUTURE

THE FOUNDATIONAL TECHNOLOGIES

NTT



INTRODUCING IOWN

More than ever, the wellbeing of people, economies, and the environment demands innovative, positive change.

Significant advances create rapid development that results in shocks and strains across all aspects of society. Expansion of devices, things, and information flow increases our reliance on electricity and drives greenhouse gas emissions.

Among the most prominent issues is the increasingly severe environmental crisis. Many technologies that improve our daily conveniences are not sustainable for the long term. With the amount of data consumed increasing, there's increased energy consumption from devices and computing; we cannot solve these problems through more software and traditional technologies. We believe that climate change is a global concern that can be addressed through next-generation technologies.

We know about the advances in artificial intelligence, virtual and augmented reality, 5G, blockchain, quantum computing, biotechnology, and other advanced technologies.

These innovations are on the verge of becoming a regular part of our daily lives. However, do we have a plan to define and build the backbone that powers innovative technologies, solutions, and interconnected networks in an accessible, cost-effective, and sustainable way.

As we look for new ideas, we must consider technology's responsible development, prioritizing innovations that respect human values and promote equity towards a more sustainable world. When innovations are created from diverse and inclusive thinking from all elements of society, then progressing technology and protecting our future is possible.

NTT

The development of new energy technologies is one area of innovation that could lead to better information processing infrastructure. There's a great need to adopt a technology that can be incorporated across multiple devices and applications. And technology with ambient intelligence tuned to people's immediate environment, enriching the end-user experience.

We must move beyond single technologies into a future that promotes improved, integrated infrastructure. A new infrastructure that is uses entirely different current information and communications technologies.

A CATALYST FOR CHANGE

A global pandemic has marked a turning point in human history. It made us strongly reconsider what is needed for the future. Today, society seems more open and ready to make changes for the better. Some new sustainable trends and behaviors shaped by the pandemic should remain and contribute to our new, more promising reality.

The pandemic-fueled shift to a more decentralized and remote world of work and play could continue to aid sustainability in many ways. Creating new virtual spaces that exceed in-person experiences will play a significant role in carbon neutrality efforts and reducing the use of fossil fuels. Expanding teleworking can reduce CO2 emissions by about 70%.

The pandemic illustrates how a widespread global event can affect local communities. It has shown us the importance of recognizing that the world is not homogenous. During this time, we have found new ways to use technology to serve local purposes and express cultural diversity, which is vital and must be retained. Successfully combining globalism and localization means enacting a 'glocalism' that respects diverse, locally rooted cultures while also pursuing global sustainability targets.

Globalization has its pros and cons. It has advanced society in new and exciting ways, improving economics, advanced technology, and collaboration worldwide. Yet, it has also fueled disparities. Many challenges contribute to today's world state, and we need a novel approach to create sustainable value for the next generation.

INNOVATION FOR A BETTER TOMORROW

The world has changed. The arrival of new smart societies is not yet possible with today's internet.

Ahead of this, the groundwork of linking supply chains alongside trustworthy organizations and people is critical. We must use technology to transform connected value chains through energy self-sufficiency and renewables.

IOWN: CREATING A SUSTAINABLE SOCIETY OF THE FUTURE

When it comes to networking, we have wired, wireless, fiber optics, LTE and 5G – to name a few. While these networks serve a purpose today, they have limitations in enabling tomorrow's enterprise and consumer innovations. How can we create a more energy-efficient network that successfully connects zero environmental harm and economic growth goals?

Innovative Optical and Wireless Network (IOWN) offers a more sustainable blueprint for the future. IOWN is a communication infrastructure that uses optical and photonic technologies that provides ultra-high-capacity, ultra-low-latency and ultra-low-power communications. It also can allow for enormous computing resources using these same optical and photonic technologies. IOWN makes it possible to utilize all kinds of information beyond the limits of conventional infrastructure. It connects vast amounts of data generated from people, devices, sensors and the digital world, processing all of this in real-time through faster, larger-scale technologies as well as enormous computing resources.

The IOWN concept aims to transform existing information and communication systems towards a new infrastructure that goes beyond the limitations of current technology.

IOWN is composed of three foundational technologies. An "All-Photonics Network" introduces photonics-based technology to the network and computing infrastructure. "Digital Twin Computing" enables future predictions by combining the real and digital worlds. And the "Cognitive Foundation®" that connects and controls everything.

NTT

The most significant impact and results come when we work together across disciplines to tackle issues and chart a better future together. The transformative vision of IOWN requires a cooperative and collaborative approach from numerous invested partners and stakeholders beyond the technology industry. Based on global, open architecture optical transport, IOWN enables more significant equity and access to a new and energy-efficient digital society for all.

MOVING FROM ELECTRONICS TO PHOTONICS:

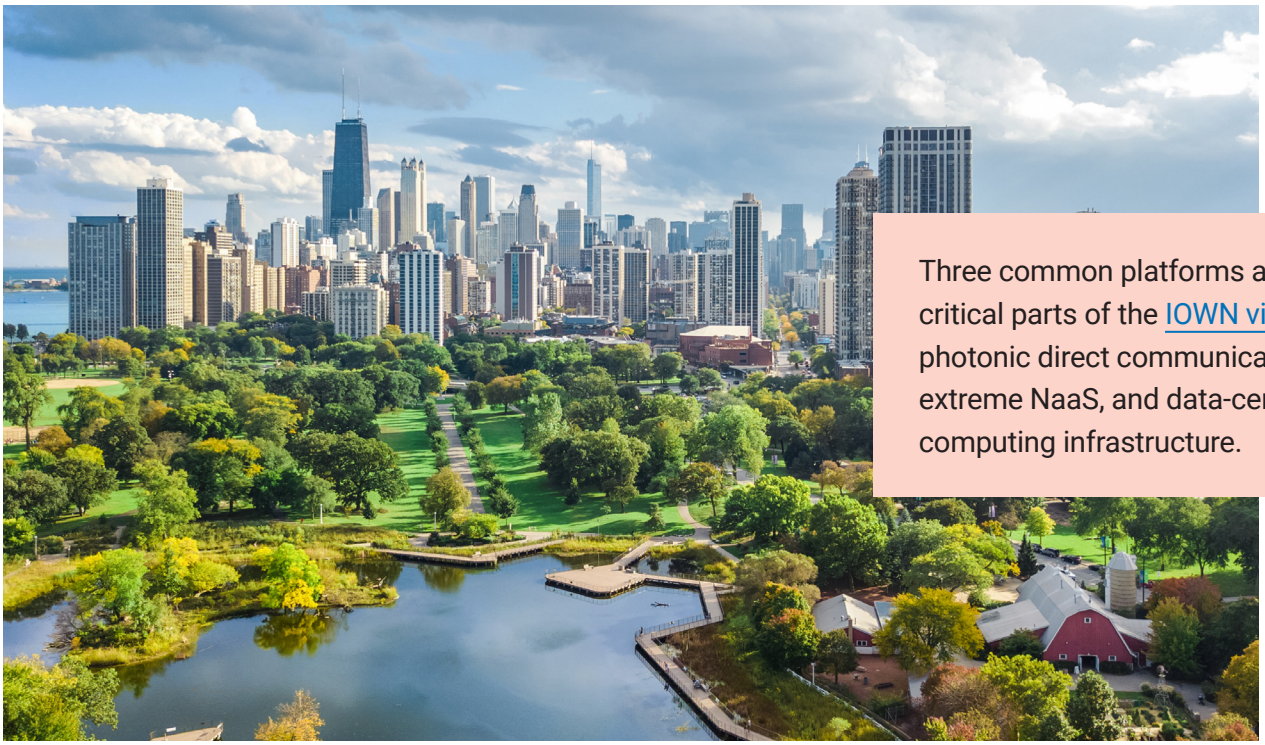
As we head towards a smarter and more diverse society, relying on our current technology to handle increased data volume would consume enormous amounts of electricity.

Manufacturing smaller mechanical, optical and electronic components and devices that enable faster communications and information processing speeds have typically driven higher power consumption levels. Current trends show that power consumption for IT-related demands worldwide could increase 5000-fold by 2030.

IOWN offers a way to reverse these trends by shifting network components electronics to photonics. Photonics is the technology of generating, controlling and detecting light particles and waves or photons.

Photonics is currently used for transmission and can be applied to computing on devices and servers to efficiently send data between chips within and between cores within chips. Photonics cuts the need for electronic signals by relying on light for lower power and latency, creating environmentally friendly, sustainable benefits and more ubiquitous access.

In addition to All Photonics Networks (APN) mentioned above, IOWN relies on two other foundational pillars; Cognitive Foundation (CF) to connect, manage and control data, as well as Digital Twin Computing (DTC) to effectively combine the real world with the digital world to create a new era of service applications.



Three common platforms are critical parts of the IOWN vision: photonic direct communication, extreme NaaS, and data-centric computing infrastructure.

IOWN promises a range of services based on low-latency, high-capacity, high-precision time synchronization and multipoint multicasting, physically and functionally merging mobile and fixed networks and a completely new data-centric computing infrastructure that will replace the IP-centric infrastructure of the past. We expect IOWN technologies to create a new world completely different from the past to improve individual wellbeing and bring us closer to zero environmental impact.

INNOVATION FOR A SUSTAINABLE FUTURE

MOVING TOWARD A BETTER US

NTT believes in resolving social issues through our business operations by applying technology for good. We help clients accelerate growth and innovate for current and new business models.

Our services include digital business consulting, technology and managed services for cybersecurity, applications, workplace, cloud, data center and networks – all supported by our deep industry expertise and innovation.

As a top 5 global technology and business solutions provider, our diverse teams operate in 80+ countries and regions and deliver services to over 190 of them. We serve over 80% of Fortune Global 100 companies and thousands of other clients and communities around the world.

www.global.ntt/isf/index.html

NTT