

# ARENA-PAC 2022 Report

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## Chapter 1. Introduction

This paper reports on the operation of ARENA-PAC (Arterial Research and Educational Network in Asia-Pacific)<sup>1</sup>, a broadband backbone network for research and education purposes in the Asia-Pacific region.

ARENA-PAC, which is operated by the WIDE Project, is a broadband backbone network for research and education purposes using a submarine cable network contracted for long-term use by the Asia Pacific Internet Development Trust (APIDT)<sup>2</sup>, a fund for the development of the Internet in the Asia Pacific region. In addition to the submarine cable network contracted for long-term use by APIDT, ARENA-PAC aims to become a wide-area high-capacity backbone network that can be called an "artery" extending across the Asia-Pacific region, as the name suggests, through interconnection with other research and education networks.

This paper reports on the current operational status, future expansion plans and international collaborative cooperation, including the 100 Gbps communication bandwidth line between Tokyo and Guam, which began operation in February 2021.

## Chapter 2. Operational Status and Expansion Plans of ARENA-PAC

As of the end of January 2023, ARENA-PAC operates the following two lines.

- Tokyo-Guam 100 Gbps line
- Guam-Singapore 100 Gbps line (Guam-SG Connectivity Consortium: a consortium of ARENA-PAC, AARNet, Internet2, and IN@IU)

In addition, preparations are underway to begin operation of the following two lines in 2023.

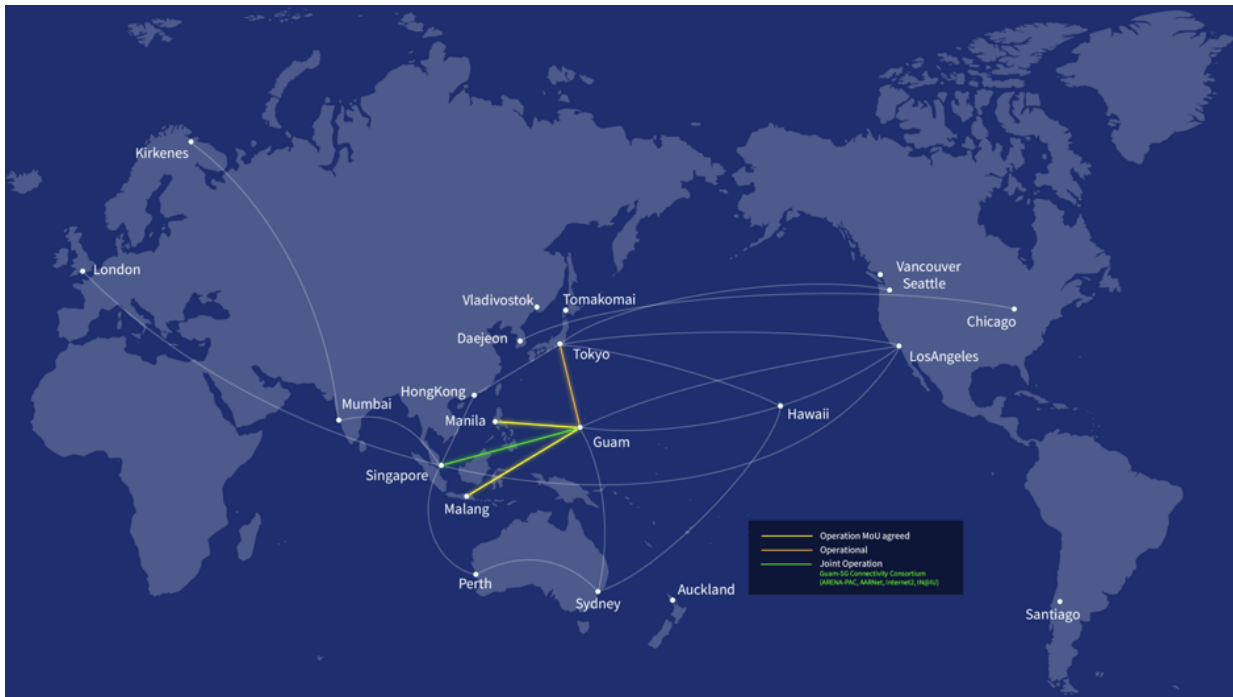
- Guam-Malang (Indonesia) 100 Gbps line
- Guam - Quezon (Philippines) 100 Gbps line

Furthermore, in collaboration with the AI<sup>3</sup>/SOI-ASIA project, which has developed, operated, and provided Internet for research and education collaboration and disaster mitigation in the Asia-Pacific region for more than 20 years, ARENA-PAC prepares to expand connection to the REN in East Timor using VPN to the National University of East Timor (UNTL) as a gateway.

Figure 1 summarizes ARENA-PAC's backbone network concept describing the circuits already in operation and future expansion plans. As shown in this figure, ARENA-PAC plans to build a broadband backbone network for research and education purposes in the Asia-Pacific region and to support international research and education activities through interconnection and collaboration with other research and education network operating organizations.

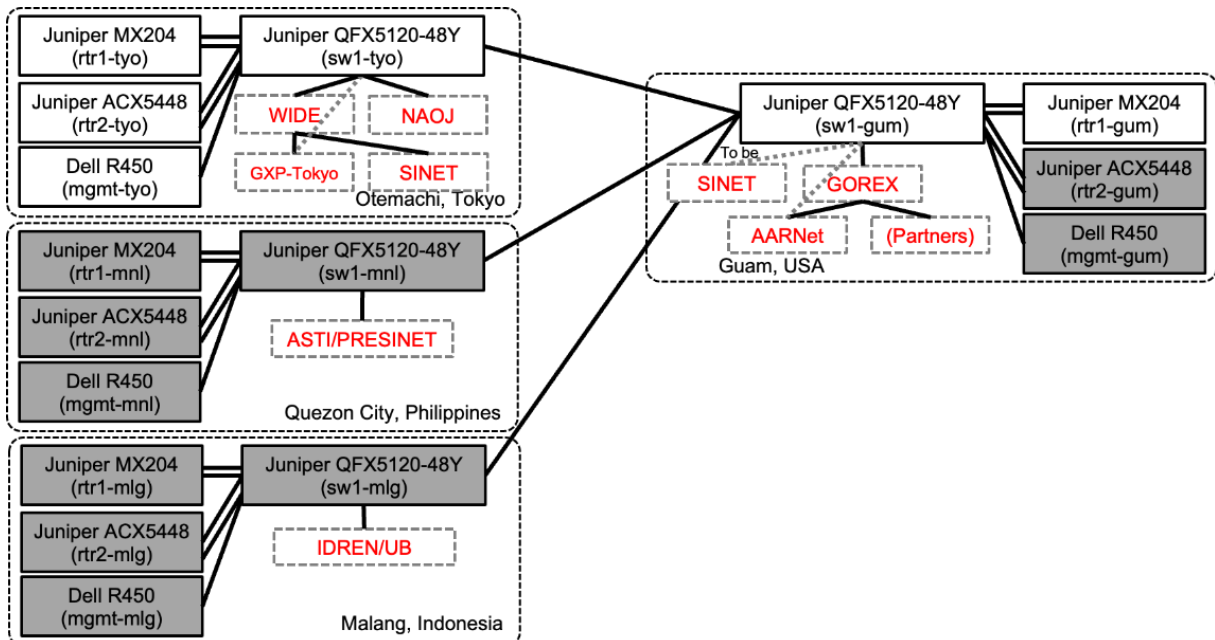
<sup>1</sup> ARENA-PAC: <https://www.arena-pac.net/>

<sup>2</sup> APIDT: <https://www.apidt.org/>



**Figure 1 Concept of ARENA-PAC backbone network**

Figure 2 shows the network configuration of ARENA-PAC. Some of the equipment for ARENA-PAC which we ordered in 2021 was delivered and was installed from October to December 2022 as shown in Figure 2. The equipment highlighted in gray is currently under transportation procedures and will be deployed in 2023.



**Figure 2 Network configuration diagram (gray represent under preparation)**

## Chapter 3. Activity report for 2022

Here are some major activities and progress in 2022.

### 3.1 Conclusion of MoUs with Indonesia and the Philippines

ARENA-PAC has signed MoUs with partner institutions prior to deployment in Indonesia and the Philippines.

On August 31, 2022, a MoU between ARENA-PAC and University of Brawijaya (UB) was signed in Bali, Indonesia. UB is the Indonesian endpoint of the IDREN (a research and education network connecting Universities in Indonesia) and ARENA-PAC. The MoU signing ceremony was attended by Indonesian Minister of Communications and Information Technology Johnny G. Plate, Director General of the Digital Agency Taro Kono, and Deputy Minister of Internal Affairs and Communications Yoshifumi Tsuge, both from Japan.

On November 15, 2022, in Quezon City, Philippines, ARENA-PAC signed two MoUs; one with the Department of Science and Technology (DOST) signed by DOST Secretary Renato Soledad Jr signed, and another with the Philippine Research, Education and Government Information Network (PREGINET), respectively.

This allows ARENA-PAC to proceed with the opening of the network with the support of the local research and education networks. ARENA-PAC is a research and education network with a wide reach in the Asia-Pacific region. Therefore, support for local operations is essential for the operation of ARENA-PAC.

### 3.2 Signing a contract for an Indonesian link

ARENA-PAC has contracted with a cable company for a 100 Gbps link between Guam and Malang, Indonesia. We had a signing ceremony in Bali, Indonesia, on August 31, 2022.

We expect the link to be operational physically by the end of November 2022 and to be delivered to ARENA-PAC in early 2023 after confirming the successful test results conducted by the line operator.

Welcoming Malang, Indonesia, as its third base after Tokyo and Guam marks a significant step forward for ARENA-PAC.

### 3.3 Signing a MoU with RENs in Japan

On October 7, 2022, WIDE Project signed a MoU with the following four parties to strengthen cooperation with each REN in Japan.

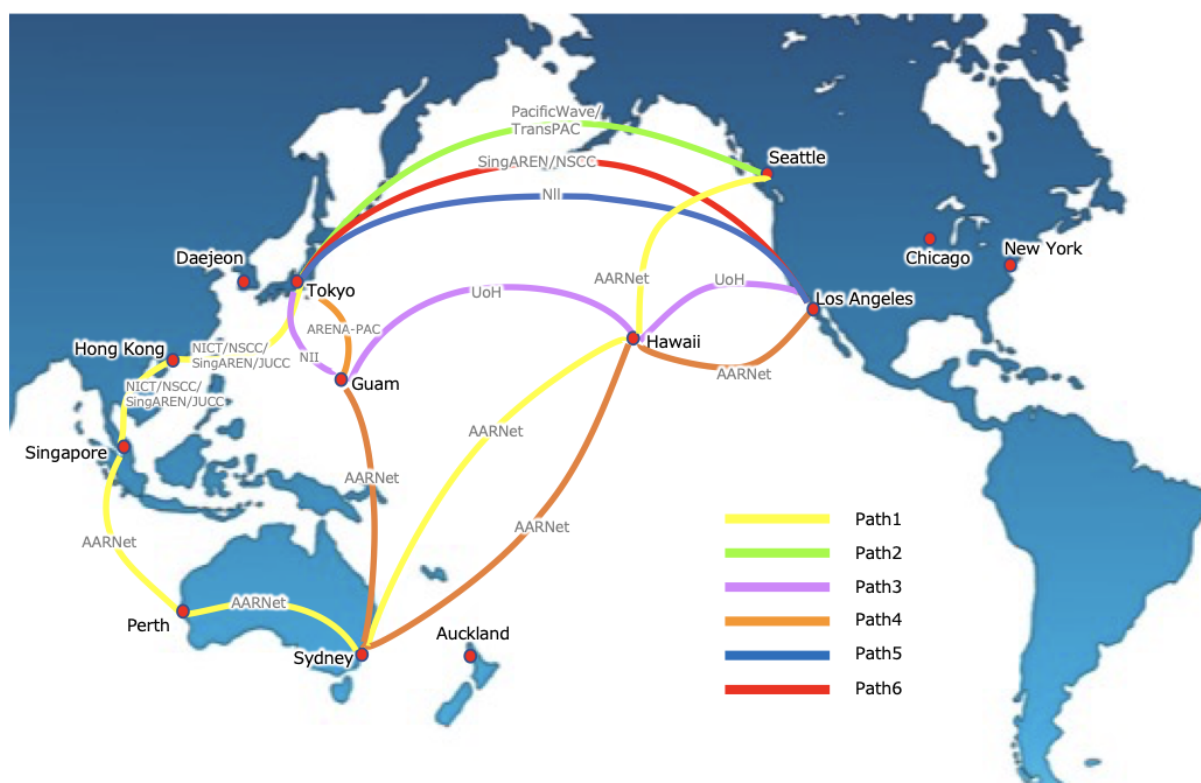
- National Institute of Information and Communications Technology (NICT)
- National Institute of Informatics, Research Organization of Information and Systems (NII)
- Secretariat of Agriculture, Forestry and Fisheries Technology Council, Ministry of Agriculture, Forestry and Fisheries (MAFFIN)
- WIDE Project (representing ARENA-PAC and other REN activities)

This MoU facilitates the smooth and effective collaboration for traffic exchange and backup operation each other between the MoU parties' RENs. It will also further promote the development of RENs in the Asia-Pacific region through the collaboration among the four parties,

especially in sharing each party's connectivity with foreign countries. All parties agreed to name this collaboration the "Coalition of Interoperable Networks for Japan and International (CINJI)" to strengthen the relationship.

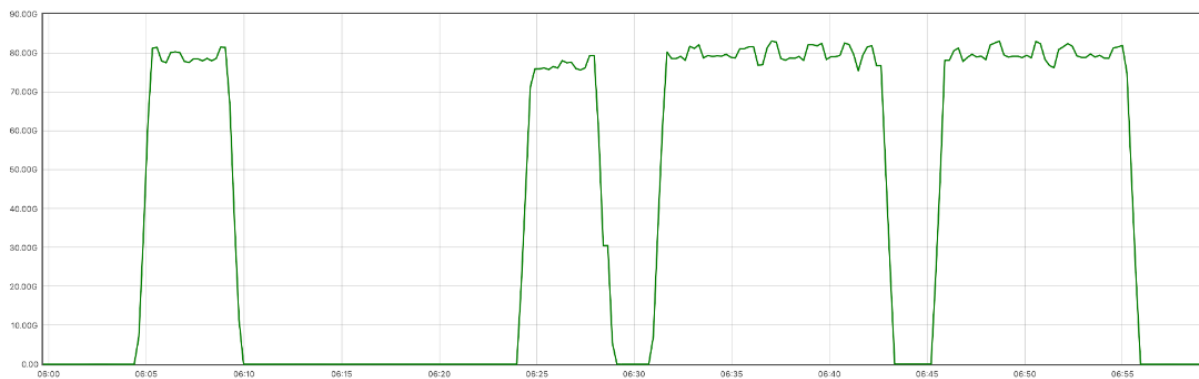
### 3.4 Cooperation with experiments in SC22

ARENA-PAC demonstrated high-bandwidth traffic transmission with APOnet members at SC22 (The International Conference for High Performance Computing, Networking, Storage, and Analysis).



**Figure 3 Six paths experiment for nearly 500bps traffic (Source: NICT experimental data)**

The demonstration, led by the National Institute of Information and Communications Technology (NICT) Testbed Promotion Center, involved the transmission of traffic approaching 500 Gbps between Japan and Dallas, Texas, U.S.A. Six Layer 2 paths were configured by APOnet members, as shown in Figure 3. ARENA-PAC was part of one of the paths, and it was confirmed that about 80 Gbps of traffic was flowing during the demonstration (Figure 4).



**Figure 4 ARENA-PAC traffic between Tokyo-Guam**

This demonstration received the SCinet Spirit of Innovation Award at SC22. ARENA-PAC was also presented with a commemorative plaque as one of the APOnet member.

ARENA-PAC will continue to contribute to diverse research and education activities through various frameworks of collaboration, including APOnet, and will strengthen cooperation with other research and education networks.

## Chapter 4. Summary

This paper reported on the operation of ARENA-PAC, a broadband backbone for research and education purposes in the Asia-Pacific region. The WIDE Project will continue to contribute to the development of the international Internet through the operation of ARENA-PAC and collaboration with APOnet and other RENs.