RIKEN Wi-Fi service in the RIBF experimental area

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Internet service is one of the essential infrastructures for research activities. For information security, networks are required to be separated depending on users and purposes. In the RIBF, an easy-to-use and secure network environment is necessary because many external researchers participate in experiments one after another. For example, a dedicated network has been constructed in the RIBF experimental area for data acquisition during experiments using the BigRIPS beam line. However, access to the Internet is accessed through RIKEN's intranetwork, and there are concerns about network separation for external researchers.

To achieve secure network separation, Eduroam and guest Wi-Fi services provided by RIKEN Information System Divisions for external researchers were introduced in the B1F and B3F measurement rooms of the RIBF experimental area. The B1F and B3F measurement rooms (each floor has an area of approximately 2000 m^2) are located apart from each other, and some rooms are separated by walls. This required the installation of a large number of wireless access points to provide wireless signals to the entire area. By adopting leaky coaxial (LCX) cables[1,2] as wireless antennas, we have successfully established a cost-efficient and easy-to-maintain Wi-Fi environment.

An LCX cable is a type of antenna in which slots are placed in the outer conductor of a coaxial cable to enable wireless communication. Figure 1 shows the structure of an LCX cable. We adopted LCX cables (Proterial Ltd. F-8D-LCX) that can be extended to a maximum cable length of 100 m and are compatible with the 2.4 and 5 GHz Wi-Fi bands. A diagram of the wiring in the B1F and B3F measurement rooms of the RIBF building is shown in Fig. 2. Boxes labeled with **AP**, circles, and bold lines are the access point, experimental room, and LCX cables, respectively. An HPE Aruba AP-504 access point, which is compliant with the 2.4 and 5 GHz Wi-Fi bands, was adopted. Two LCX cables are connected to each access point, and

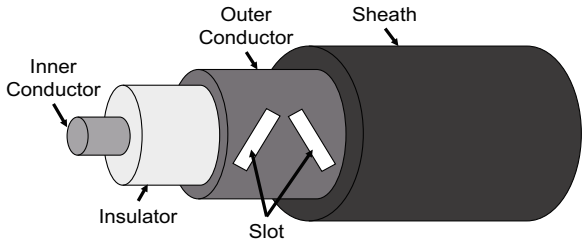

Fig. 1. Structure of an LCX cable.

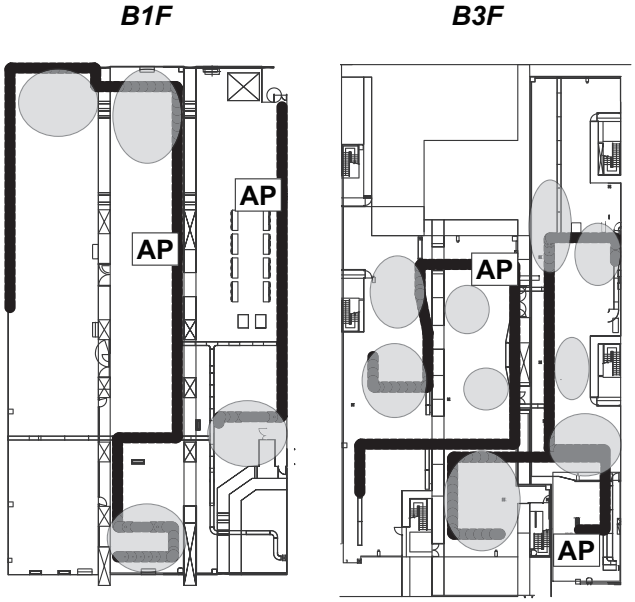

Fig. 2. Wiring diagram for the B1F and B3F measurement rooms in the RIBF building.

two access points were installed on each floor. Eight LCX cables (15, 38, 40, 50, 50, 60, 67, and 80 m) were used, and the total length was 400 m. Cables were routed along walls or cable racks on the ceiling. As shown in Fig. 2, four access points and eight LCX cables were sufficient to cover all the B1F and B3F measurement rooms.

The Wi-Fi signal strength is generally considered good if it is above −50 dBm. Near the access point, the Wi-Fi signal strength was approximately −40 dBm for both the 2.4 and 5 GHz bands. At a distance of 80 m from the access point, the signal strength was about −70 dBm for the 2.4 GHz band and less than −90 dBm for the 5 GHz band. However network communication was possible with the 2.4 GHz Wi-Fi band.

These results show that the Wi-Fi environment using LCX cables is effective in an experimental area such as the RIBF, where several measurement rooms are separately located. In the future, we plan to construct a Wi-Fi environment with LCX cables in the measurement rooms of the Nishina Building.

References

1) `https://ww.hcnet.co.jp/products/wireless/lcx/lcx.html`.
2) T. Igarashi *et al.*, in *Computers in Railways IX*, edited by J. Allan *et al.*, (WIT Press, 2004), p. 455.

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