Boosting Urban Connectivity with FTTA Technology in Bandung, Indonesia

■ Background

With the rapid global adoption of 5G and the exponential growth of Internet of Things (IoT) devices, urban communication networks face unprecedented demands for greater capacity, faster speeds, and higher stability. Traditional base station architectures relying on copper cable transmission are increasingly inadequate for meeting these requirements, particularly in dense urban areas with heavy commercial activity and numerous IoT applications.

In Bandung, Indonesia, a combination of high population density, bustling commerce, and complex IoT usage—including intelligent transportation systems and smart-city infrastructure—created pressing demands for communication infrastructure improvements. Consequently, Fiber to the Antenna (FTTA) technology emerged as an optimal solution, offering high bandwidth, low transmission loss, and robust resistance to electromagnetic interference (EMI).

■ Challenges

The city's existing network faced significant obstacles:

Bandwidth Limitations:
Traditional copper cable infrastructure struggled to support the high data volumes of emerging 5G applications such as HD video streaming, cloud gaming, and IoT traffic, resulting in network congestion and degraded user experiences.

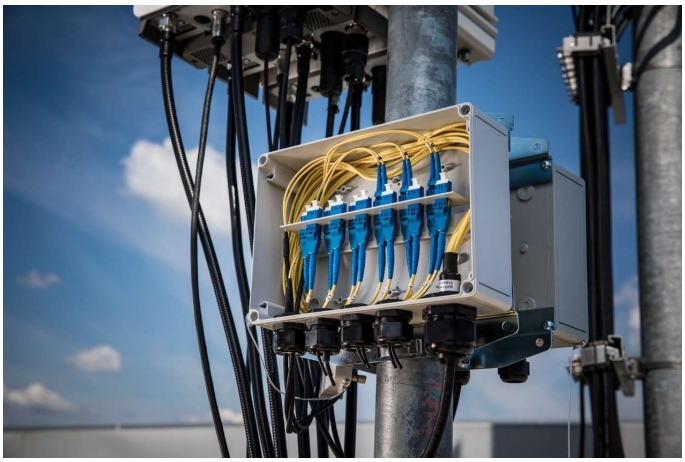
Signal Loss:
Copper cables inherently suffer from considerable attenuation, even over relatively short distances. Compensating for these losses required expensive cable upgrades. Signal losses significantly reduced actual network coverage, creating blind spots and impairing seamless connectivity.

Electromagnetic Interference (EMI):
The dense urban environment featured numerous electrical devices causing electromagnetic interference, further deteriorating signal stability, accuracy, and overall network quality.

■ Solutions

To overcome these challenges, Bandung deployed a comprehensive FTTA solution:

Technical Architecture:
FTTA involved laying optical fiber directly from the baseband unit (BBU) in the ground-level equipment room to remote radio units (RRUs) mounted near antennas. RRUs converted optical signals to electrical signals, delivering clear and robust transmissions directly to end-user devices.



Advanced Equipment Selection:

High-performance single-mode optical fibers were selected for their low attenuation and high bandwidth, ensuring rapid and reliable 5G data transfer. Optical modules employed advanced modulation techniques, significantly enhancing sensitivity and reducing power consumption.

Efficient Deployment Practices:

Installation was simplified by directly connecting fibers from the BBU to RRUs. Special attention was paid to ensuring the correct bending radius of fibers at installation points, preventing unnecessary signal attenuation, and maximizing overall network performance.

■ Results

After the implementation of the FTTA solution, the network performance in Bandung has been significantly increased:

- **Network transmission bandwidth improved significantly,** supporting high-traffic applications effectively.
- **Data transmission rates increased severalfold,** providing robust support for next-generation digital services.
- **Base station coverage area expanded by over 30%,** ensuring seamless connectivity across the urban area.
- **Network failure rates dropped by 50%,** reflecting greatly enhanced network reliability and availability.

The successful FTTA implementation has positioned Bandung's network infrastructure to sustainably support the burgeoning demand for high-speed connectivity and advanced IoT applications. This deployment demonstrates a replicable model for urban centers globally aiming to achieve superior network performance, enhanced user experiences, and future-ready connectivity.