

PowerComm: World's Largest Metro Ethernet Deployment



PowerComm is a facility-based telecommunications carrier and is a subsidiary of KEPCO, Korea's National Electric Power Corporation. PowerComm operates the largest high-quality, fiber optic network in Korea and is building a nation-wide, high-speed telecommunications network.

PowerComm is the first national telecommunications carrier to deploy an all-Ethernet metropolitan area network in Korea based on advanced Riverstone service-creation routers. PowerComm is installing over 1,000 Riverstone routers in the greater Seoul metropolitan area to create the world's largest metro Ethernet network. PowerComm's next-generation network will unify its cable and last-mile Ethernet sub-networks, allowing the national carrier to offer its own advanced telecommunications services while leasing the network to other service providers in Seoul and neighboring areas.

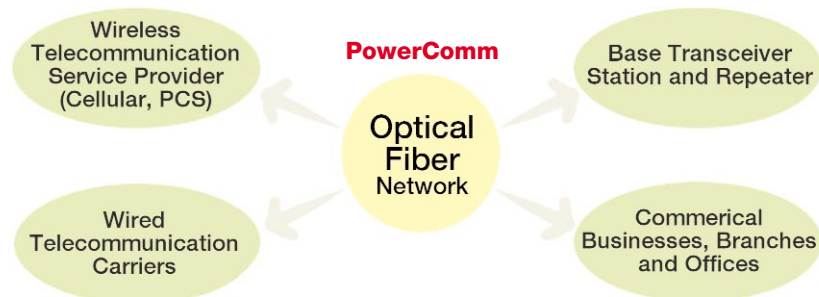
PowerComm's Network Infrastructure

PowerComm's network consists of over 60,000 km of optical fiber and over 4,000 km of High Frequency Cable (HFC) network throughout Korea. PowerComm's objective is to provide fair and reasonable access to its telecommunications network for companies and service providers, enhancing competition in the telecommunications industry in accordance with the Korean government's goal to restructure the public sector.

The optical fiber network leverages KEPCO's electrical power transmission towers and electrical distribution pylons throughout Korea, reaching even the most remote regions of the country. The network provides facility-based telecommunications service providers with a stable and high-quality infrastructure.

PowerComm's customers include:

- Wireless communication providers that lease telecommunication facilities, such as exchanges, base stations, and relay stations.
- Wired communication carriers that lease telecommunications lines installed in offices, buildings, and residential apartments.
- Broadband service providers that lease lines installed in residential homes and commercial premises.



PowerComm Optical Fiber Network

**Metro Routers That
Convert Raw Bandwidth
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PowerComm's HFC network is a high-quality, two-way broadband network, transmitting cable TV services to over 1 million subscribers in 64 districts throughout Korea. As the largest cable TV network service provider in Korea, PowerComm provides network services to program providers and system operators, transmits cable TV programs, and relays live broadcasts across the nation.

"We are convinced that our new next-generation network will enable us to successfully deliver and meet the stringent demands of our customers."

Gil-Hwan Oh
Access Network Director,
PowerComm

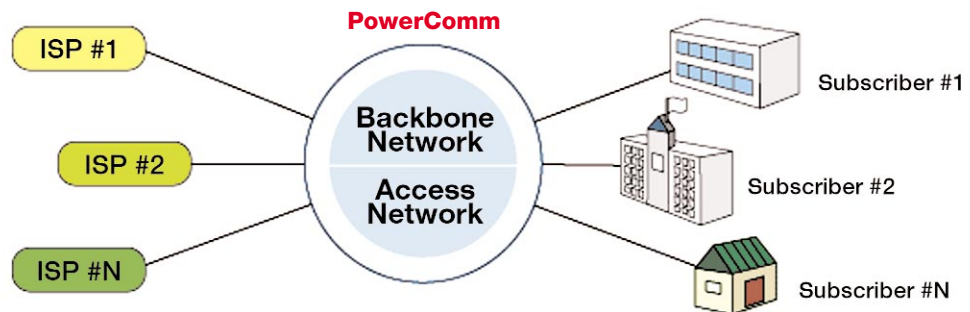
PowerComm's Challenge

PowerComm's strategy is to become the premier wholesale metro service supplier for large carriers in Korea. Although PowerComm has significant fiber and HFC assets and is the leading broadband service provider in Korea, they wanted to offer more flexible and cost-effective Ethernet services, particularly to the 11 million residents of Seoul, one of the world's largest metropolitan regions.

PowerComm wanted to improve solutions for customers with new Ethernet access services that provide high-speed, dynamic bandwidth that is tailored to specific applications. Real-time gaming, video-on-demand, and live broadcasting of major events are examples of bandwidth-intensive applications that are driving PowerComm's requirement to deliver Ethernet access services:

- Gaming parlors providing interactive video games over the Internet are very popular in Korea, with some parlors requiring average bandwidth of 200 Mbps, a level of bandwidth that is uneconomical when using traditional technologies.
- Cable TV program providers and system operators that use PowerComm's network require high-speed, flexible bandwidth that can also provide the quality of service and low latency required to deliver high quality video and live broadcast TV.

PowerComm also required a single metro backbone infrastructure that could unify their existing cable networks with the new last-mile Ethernet services. The main business driving force for this unification was to reduce costs. Rather than extend their SONET/SDH core into the metro, PowerComm wanted to investigate Gigabit Ethernet as an alternative, lower-cost metro backbone solution. They found that for a lower capital expenditure (CAPEX), they could reduce their operational expenditure (OPEX) by using a Gigabit Ethernet metro infrastructure rather than a traditional SONET/SDH metro infrastructure.



High-speed Internet Network structure

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The main technical challenge facing PowerComm was to show that a Gigabit Ethernet metro backbone solution was viable and that it could provide services as reliably as a traditional SONET/SDH solution. PowerComm set out to investigate Gigabit Ethernet technology and the solutions available from a number of vendors. They developed a set of rigorous product evaluation and test criteria to select a suitable vendor.

● "Riverstone's technology will save considerable costs by allowing us to leverage our existing fiber infrastructure."

Gil-Hwan Oh
Access Network Director,
PowerComm

Riverstone's Solution

Riverstone proposed an Ethernet-based metro solution to PowerComm that consisted of three tiers:

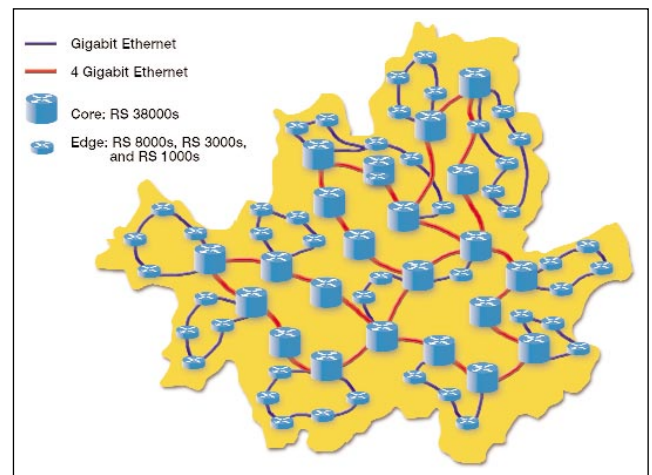
- Metro Core Rings – These aggregate traffic from the central Points of Presence (POPs) within major metropolitan areas and provide connections to the HFC and backbone networks. They use Gigabit Ethernet links in parallel for capacity and redundancy.
- Metro Edge Rings – These aggregate traffic from the edge POPs within metropolitan area districts and provide connections to the Metro Core Rings. They use Gigabit Ethernet.
- Metro Access Rings – These aggregate traffic from subscribers and provide connections to edge POPs. They use Gigabit Ethernet and 10/100 Ethernet for subscriber access.

Riverstone positioned RS 38000 aggregation routers for the Core Rings, RS 38000 aggregation and RS 8000 metro routers for the Edge Rings, and RS 3000s and RS 1000 metro access routers for the Access Rings. The largest deployment is in the Seoul metropolitan area, and consists of multiple rings built using over 1,000 Riverstone metro routers. The solution provides Layer 2 VLAN services and Layer 3 routing services within the Metro Rings, and uses Riverstone's Rapid Ring Spanning Tree technology to provide high availability and rapid reconfiguration, and to simplify operations. Riverstone's hardware-based rate limiting and advanced traffic engineering is used to provision bandwidth and provide appropriate quality of service.

The design uses the Open Shortest Path First (OSPF) routing protocol, with each Metro Core Ring configured as a single OSPF Backbone Area and each Metro Edge Ring configured as an OSPF Sub Area. The routers within the main central POPs are configured as Interior Border Gateway Protocol (IBGP) and are linked to the main border routers in PowerComm's backbone network.

Why PowerComm Chose Riverstone

PowerComm asked several vendors to propose solutions and subjected each vendor's solution to rigorous testing. Three vendors dropped out early during the initial testing, leaving Riverstone and one other vendor.



The PowerComm/Seoul Ethernet Network

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● "Given Riverstone's successful track record deploying and supporting metro networks with major carriers throughout Asia and the rest of the world, Riverstone quickly emerged as one of a few vendors capable of supporting a deployment of this scale."

Gil-Hwan Oh
Access Network Director,
PowerComm

During the final round of testing, PowerComm found that Riverstone's OSPF and BGP routing performance was more robust and scalable. PowerComm also found that Riverstone's advanced Hitless Protection System (HPS) provided Layer 3 resilience. HPS is designed to bring high availability to metropolitan area networks by allowing seamless failover between router control modules without loss of data or control traffic.

Riverstone was able to demonstrate Multi-Protocol Label Switching (MPLS) using Layer 2 Martini Draft tunnels, and to show leadership in MPLS development through its work on Lasserre Draft tunnels. MPLS plays an IP service creation role, providing traffic engineering and bandwidth management for IP services such as bandwidth-on-demand, transparent LAN services, and virtual private networks.

Riverstone was also able to show a well-advanced roadmap for Resilient Packet Ring (RPR) and 10-Gigabit Ethernet. RPR combines the best of SONET/SDH resilience with Ethernet compatibility, providing a powerful way of leveraging value-added IP services, while 10-Gigabit Ethernet will rapidly become the preferred technology for the metro backbone. Using Riverstone's solution, PowerComm would be able to upgrade the RS 38000s in the Core Metro and Edge Metro Rings to run RPR and 10-Gigabit Ethernet without incurring significant additional capital cost.

Finally, PowerComm wanted a vendor that could offer service and support locally during such a large metro deployment. Riverstone's partner, KDC, the leading network integrator in Korea, was able to assist PowerComm in designing and positioning its next-generation network, and to deploy and service the Riverstone routers locally. Riverstone's extensive experience in Tier 1 networks, such as British Telecom, Cox Communications, Hutchison Global Crossing, KT, Qwest, and Telefonica, also convinced PowerComm that Riverstone's experienced customer care organization would be able to provide the logistics necessary for a large rollout of best-of-breed metro technology.



The RS 38000, RS 8000, RS 1000, and RS 3000

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