River **STONE** NETWORKS ™

KT: Doing Metro Networks Right the First Time

KT This case study details the operations of KT's project Ntopia Optical Metro deployment. Project Ntopia's initial rollout will supply about 80,000 dwelling units with Ethernet access over optical fiber this year. It is one of Asia's largest last-mile Optical Ethernet network deployments to date. While much of the rest of the developed world and their national carriers are concerned with maximizing their deployed copper networks, KT has been steadily building some of the world's largest last-mile optical networks. KT selected Riverstone equipment to handle the aggregation of last-mile optical Ethernet traffic and the uplink to the pre-existing SONET/SDH core.

An Intense International Competition to Power Project Ntopia

KT chose Riverstone routers for project Ntopia, after a lengthy and intense competition. "This was a big one, both in size and historical significance. Seven different router vendors came to bid for the project, including all the European and North American heavyweights," said Hyeon-Joo Lee, Sales Director of Riverstone Networks Korea Region.

Riverstone was selected for both of the two openings for Metro routers. "For Metro routers, Riverstone is the clear leader. Even for traditional core functions like OSPF/BGP routing throughput, which we need, Riverstone came out ahead of well-known core routing companies. And when it came to putting a range of TDM and optical interfaces in a compact access router, Riverstone had no peer."

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Sales Director,
Riverstone Networks Korea Region

A Combined Legacy / Ethernet Solution

Project Ntopia uses a mixture of Ethernet in the last mile and TDM/SONET/SDH uplinks to provide high speed optical access. For high-density areas, approximately 10-15 buildings are served by an RS 8000 for high-density Ethernet aggregation from individual units, uplinking to the Metro core with multiple Packet over SONET/SDH (POS) OC-3c uplinks. Lower-density areas use an RS 3000 optical router equipped with dual T3 clear channel line cards in the RS 3000's swappable module bay.
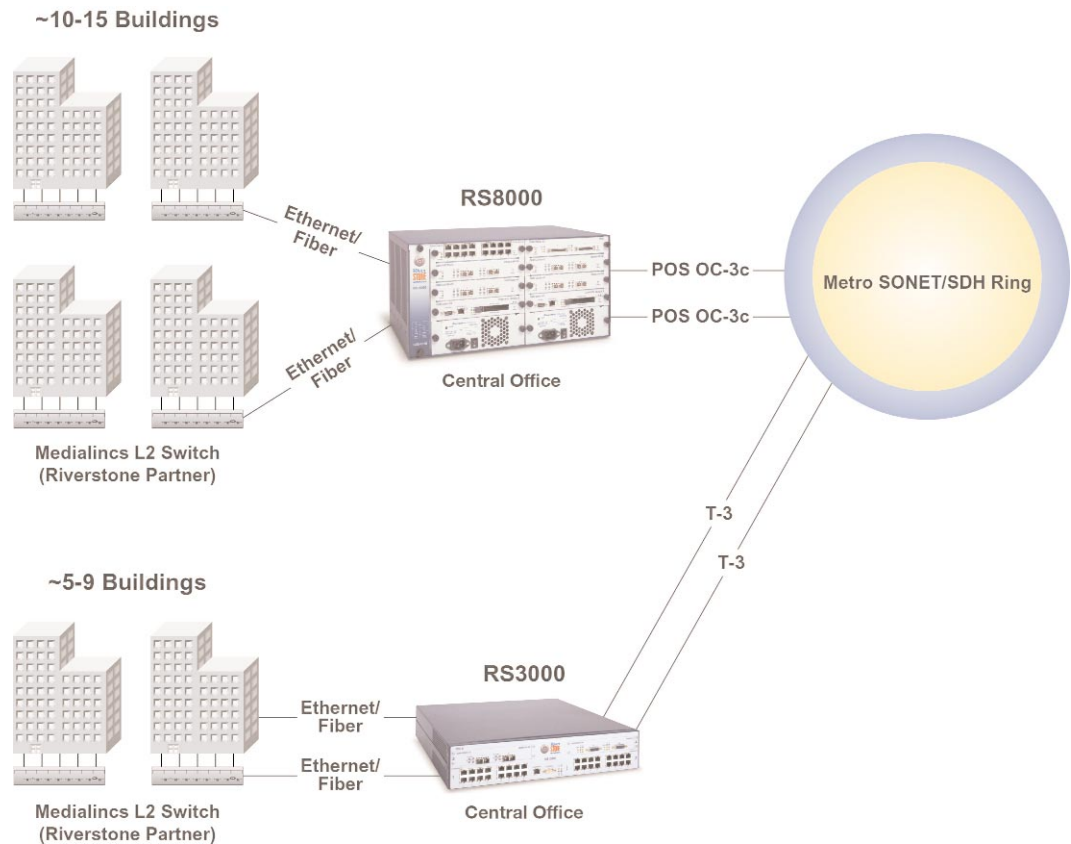
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The basic access network is diagramed as follows:

~10-15 Buildings

Ethernet/Fiber

RS8000

POS OC-3c

POS OC-3c

Metro SONET/SDH Ring

Ethernet/Fiber

Central Office

**Medialincs L2 Switch
(Riverstone Partner)**

T-3

T-3

~5-9 Buildings

RS3000

Ethernet/Fiber

Ethernet/Fiber

Central Office

**Medialincs L2 Switch
(Riverstone Partner)**

The resulting network provides generous end-user bandwidth over the last-mile fiber — outstripping Cable, DSL, and other last-mile solutions. The basic RS 8000 configuration provides more than 300 Megabits of provisionable bandwidth. Oversubscribed by a typical 30:1 ratio for residential use, this means providing 900-1,800 families with a generous 5 Mbps or even 10 Mpbs access. As demand increases, KT can simply add more Ethernet interfaces and more or higher bandwidth POS/SDH or T-3 connections.
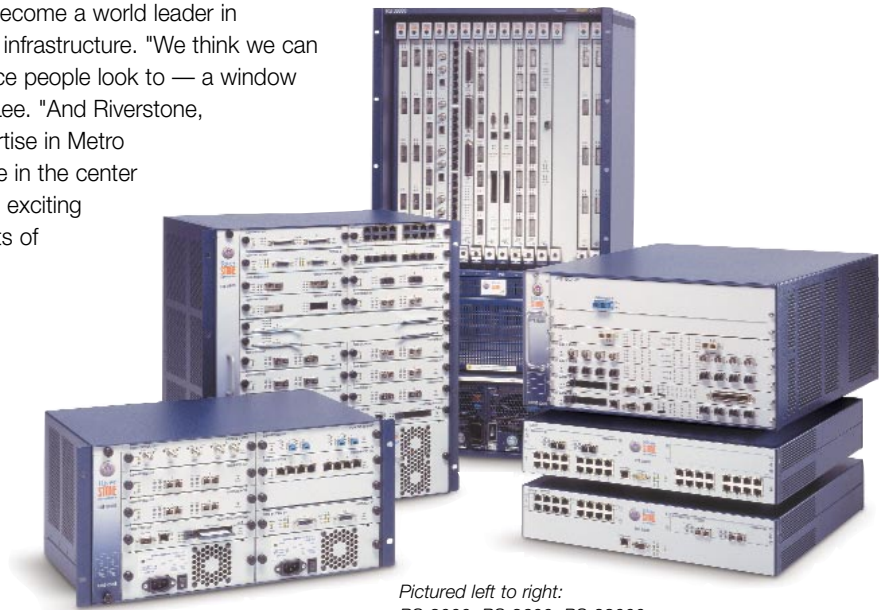
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The hardware-based rate-limiting features built into Riverstone's routers are critical to the KT access network. Using in-bound rate limiting, Riverstone is able to police individual apartments to the 5 or 10 megabit bandwidth maximum. Moreover, Riverstone is the only Metro router capable of individually policing thousands of flows (each corresponding to individual units), necessary to support the number of customers on the Ntopia network. Overall, the Riverstone rate-limiting architecture is essential to guaranteeing fair sharing of available bandwidth.

Finally, KT will plan to use Riverstone leading hardware-based accounting architecture to implement a usage-based billing system — another revenue driver that North America has yet to take full advantage of. KT will charge end-users on a per-packet basis, and also on the basis of maximum bandwidth used.

"We intend to make full use of the Layer 3 and Layer 4 intelligence built into Riverstone's routers," said Lee. "The accurate, usage-based billing that Riverstone enables alone will provide a significant source of retained revenue that might otherwise be lost."

Korea: Soon to be Most Wired Country on Earth?

Thanks to an aggressive and visionary national carrier, Korea is poised to become a world leader in telecommunications infrastructure. "We think we can make Korea the place people look to — a window to the future," said Lee. "And Riverstone, thanks to their expertise in Metro routing, will get to be in the center of some of the most exciting network deployments of this decade."

Pictured left to right:
RS 8000, RS 8600, RS 38000,
RS 16000, RS 3000 and RS 1000.

Metro Routers That Convert Raw Bandwidth into Profitable Services

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