

The logo for Corning, consisting of the word "CORNING" in white, uppercase, sans-serif font, centered within a solid blue square.

Rocking the Foundations of the Last Mile

Robert Whitman

A new technology from Renaissance and a mounting sewer system crisis in U.S. cities may forever change how we view the viability of last-mile fiber deployment

Most people rarely consider the sewer system running beneath their communities. The wastewater these pipes are drawing away from homes and businesses is not something most people want to think about.

But the Environmental Protection Agency is thinking about it. And they're worried. A draft report by the Environmental Protection Agency projects that in fewer than 15 years, the U.S. will be in a very messy situation, with more than half of the country's sewer pipes in poor or very poor condition -- or broken.

On the telecom front, U.S. telecom industry analysts are worried, too. While the wildly misunderstood "fiber glut" debate continues, there remains a serious problem -- the lack of last-mile fiber-optic connectivity. Less than 5 percent of the nation's businesses has direct fiber-optic access, their high-speed LANs dribbling data through the last-mile bottleneck. The United States is trailing ever farther behind in fiber to the home (FTTH) deployment, with Japan, Sweden and Italy far outpacing the U.S. in installed FTTH lines. The vast majority of American households accessing the Internet are still dialing up, wading along at 56k (at best) through a World Wide Web that is hosting increasingly compelling, high-bandwidth content (see related story "Not-So-Foolish Games" in this issue of *GuideLines*). Yet the perceived complexity and cost of deploying fiber to the business or home has been viewed as an overwhelming barrier to true broadband adoption.

What do degrading sewer lines and the increasing need for broadband have in common? More than you might think, thanks to a disruptive technology that Renaissance Integrated Solutions is bringing to the market, a technology that may radically alter how the viability and economics of last-mile fiber deployment are viewed. For municipalities, for service providers and for businesses and residents -- this may just change everything.

Two Systems: No Waiting

Stephen Paletta, CEO of Renaissance Integrated Solutions (RIS), started in the utility infrastructure business, trenching pipelines for sewer and water systems. In 1991, he took his trenching expertise to the fiber-optic industry, installing metro networks in New York City for several competitive and incumbent carriers. While growing his fiber-optic installation business, he developed and patented two unique technologies/processes for sewer repair that would allow sewers to be built or rehabilitated without trenching.

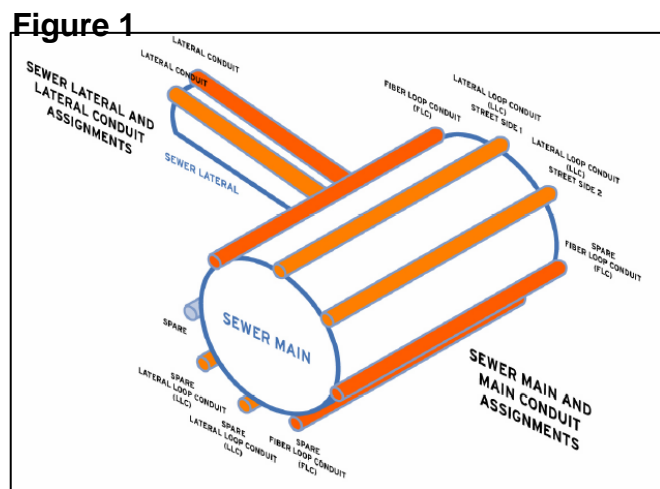
When telecom spending began to decline, and the need for sewer rehabilitation nationwide became alarmingly apparent, Paletta began giving his trenchless technology additional consideration.

"What if, while you were repairing a sewer pipe, you could simultaneously deploy fiber to every home, every building, in a city?"

The result was Paletta's patent-pending dual-purpose rehabilitation (DPR) solution, which uses pipe-bursting technology to replace failing sewer systems -- main lines as well as the lateral connections to buildings -- with new high-density polyethylene (HDPE) pipes. Pipe bursting, a widely accepted method for infrastructure rehabilitation, essentially hammers through existing pipelines and compresses the pipe fragments into the surrounding soil, effectively upsizing the capacity of the existing thruway, and then typically drags new pipe behind it.

Pipe-bursting, as a trenchless solution, is very appealing to municipalities upgrading buried utilities, as there is less construction, less disruption of existing infrastructure and less cost.

What makes Renaissance's DPR solution unique is that in addition to taking advantage of the benefits of pipe bursting to rehabilitate sewer lines, fiber-optic conduits are installed around the exterior of the new sewer pipes. The result is two separate infrastructure assets, one sewer and one fiber-optic, using the same right of way and reaching to every commercial and residential building on every street in the city. And unlike other methods that may utilize sewer rights of way, the fiber cables are never located within the sewer pipe, keeping the two systems entirely independent (Figure 1).



"As far as we know, this is the only technology that allows fiber to be installed outside of sewer lines, simultaneously taking advantage of the same right of way but not interfering with the sewer system," says Stephen Schoffstall, senior vice president of business development, Renaissance Integrated Solutions.

The technology has been tested in trial deployments in Jacksonville, Florida; in August 2001, the city, which was in the midst of a sewer rehabilitation, invited Renaissance Integrated Solutions to use the technology on a street-by-street basis. The testing went extremely well and Renaissance has since shown the technology to a number of other cities and their public works directors.

"We've passed with flying colors the due diligence from the public works people," Schoffstall continues. "At first, they look at this and think, 'How is this technology going to interfere with what we're doing?' Quickly they learn it's a very elegant solution that has no impact on the way they install, upgrade or maintain their plants."

In fact, Renaissance Integrated Solutions does not install the new pipe with fiber conduit themselves. Instead, they work alongside the city's engineers and contractors, allowing them to integrate it into their own systems and standards. The company is working with four different cities to implement additional demonstration projects beginning in early 2003. One of the demos is a 40,000-foot pilot project connecting from 500 to 1,000 buildings.

Turning Money Pits Into Money Makers: The Municipal Value Prop

"Traditionally, sewer rehabilitation -- or any infrastructure rehab -- is just a money sinkhole," Paletta says. "Municipalities have to do it, but they're not adding a new revenue source to help pay for it. It's not like they're building to a new community area or additional tax base -- this is replacement. So to pay for the rehab, they have to raise taxes or raise service fees, sometimes by as much as four times the current rates. Which doesn't make anyone happy, politicians or taxpayers."

Yet it is a situation more and more cities are finding themselves facing. Atlanta, Birmingham (Alabama), Honolulu, Los Angeles and Miami are just a few of the cities that have been taken to court by the U.S. Environmental Protection Agency recently and ordered to correct the wastewater problems that come from aged and often low-capacity sewer systems. Atlanta's federally mandated sewer upgrade is estimated at \$3 billion. In the last year, Baton Rouge, Cincinnati and Baltimore have reached court settlements -- in the hundreds of millions of dollars -- with the EPA requiring them to upgrade their systems.

With Renaissance's solution, municipalities can deploy two systems for the cost of one, rehabilitating their existing sewer system to meet EPA requirements while simultaneously creating a brand new revenue source -- a fiber-optic network they can lease to carriers -- to pay for a portion, possibly all, of the rehabilitation. And while RIS is focusing largely on sewer rehabilitation now, the DPR solution also works with other municipal infrastructures, including gas and water systems.

"The DPR solution allows municipalities to monetize imbedded assets, ensuring federal compliance while increasing the economic value of their city," says Paletta.

Consider a one-year, one-million-foot sewer rehabilitation in a major U.S. city, which could easily be expected to cost \$100 million through traditional pipe-bursting replacement. After one year, the city has replaced one million feet of sewer line and is now EPA-compliant. They also have a \$100 million debt with no additional revenue to pay for it. Nor are residents seeing any additional service or value to them -- "As long as the toilet flushes, most people show little concern for the condition of the city's sewer infrastructure," Paletta adds.

With the DPR solution, the same city could spend roughly \$110 million to rehabilitate the same one million feet of sewer line and become EPA compliant. In addition, the city now has fiber-optic access to every single residence or commercial building, rich or poor, big business or small. Not only has the city created a new revenue source (via the fiber-optic conduits) to help pay that \$110 million debt, it has also installed a high-tech infrastructure that will help it recruit new commerce to the community. And taxpayers see a benefit through new value-added fiber-optic services.

Nearly as important to municipalities as the revenue potential may be the nuisance factor that the DPR solution addresses. As trenchless solutions are less disruptive to current infrastructures, take significantly less time than trenching, and are safer to both construction crews and the environment, pipe-bursting methods are appealing to public works agencies. Once the sewer system is rehabilitated, it requires much less maintenance than the aging infrastructure engineers were dealing with before. And as the fiber-optic network is not within the sewer system, crews do not need training in dealing with a new technology.

In light of renewed interest in disaster recovery plans, an additional benefit is that installing networks using sewer systems' natural rights of way gives them added protection compared to other in-ground infrastructure and above-ground utilities. Sewer lines are usually the deepest infrastructure in the ground -- 8 to 10 feet down compared with 5 to 6 feet with other utilities.

"You put your fiber with the sewer pipes and it's safer, from disaster and from other street work," concludes David Rubenstein, vice president of corporate development and general counsel, Renaissance Integrated Solutions.

Ready-Made Access: The Carrier Value Prop

For telecommunications carriers, Renaissance offers a low-cost way to grow their network, and their customer base, in a capital-depressed market. The new advanced fiber infrastructure created by the DPR solution enables future revenue-generating services that would not be supported by current networks.

"Capitalists are not typically financing telecom carriers," says Paletta. "And when they are, the interest rates and the debt ratings cripple any competitive business model."

David Isenberg, principal Proslutantsm, isen.com LLC, concurs; Isenberg cites the impact of deployment costs on a carrier's business model as a major barrier facing last-mile fiber optics, even before the telecom downturn.

The DPR solution, installing the fiber conduits simultaneously with the municipality's utility upgrade, takes the bulk of the capital expense out of the equation for carriers who need to grow their networks within cities and to customers.

"We have to find creative ways to get fiber into our cities and towns and neighborhoods and Renaissance's technology looks like a really good way to do it," says Isenberg. "The idea of piggybacking on other infrastructure updates that are happening in communities is fabulous. Definitely a strong approach." Illustration 2 demonstrates how Renaissance's solution deploys fiber directly to the building.

What types of carriers are interested in this symbiotic approach? All types, says Schoffstall, who has had discussions with incumbents and competitive carriers about the technology.

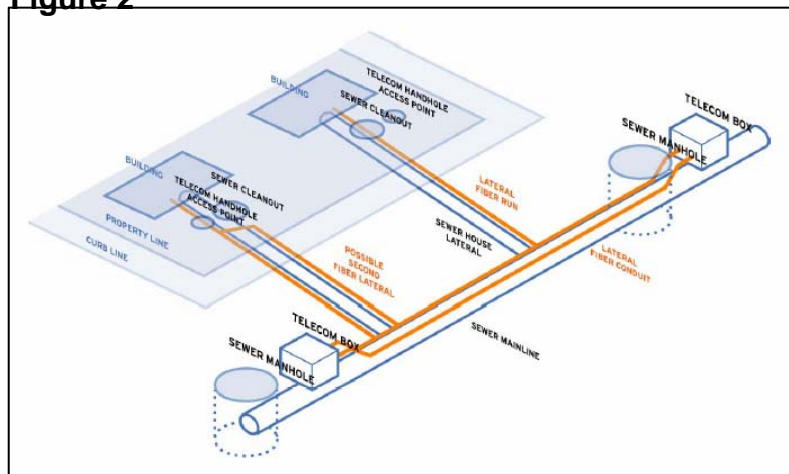
For incumbent carriers who already have an optical footprint in a city, even passing most of their customers, they may lack the lateral connections that get them directly from the street to their customers' doors. They may even have managed to connect to their customers' buildings but lack the dual-entry connectivity that is increasingly popular with commercial customers. In many cases, the carrier's existing footprint within the city is at capacity and more bandwidth -- enabled by the conduits installed with the RIS solution -- is needed.

For those "non-footprint" carriers interested in growing their presence in a new community, Renaissance offers offers lower-cost entry and accelerated provisioning into new markets. Because there are several conduits on every line, more than one carrier can take advantage of the infrastructure.

"There is high excitement in the response we've gotten from carriers," Rubenstein says. "It's been 'How can we help you make this happen?' They absolutely see the value and the economic viability of this to their business and their customers."

Putting It All Together: Everybody Wins

Figure 2

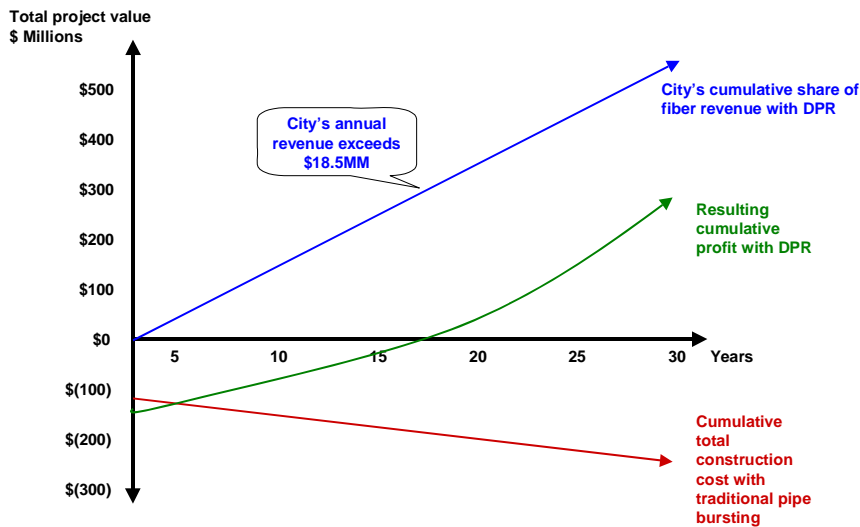


Renaissance works in partnership with municipalities to develop flexible business plans that benefit cities, carriers, content and service providers, as well as commercial and residential citizens.

For municipalities facing mounting environmental, financial and regulatory pressures from their failing sewer systems, Renaissance Integrated Solutions offers them the opportunity to generate immediate and recurring revenues from their sewer assets while upgrading them. Working with its construction and engineering firms alongside Renaissance Integrated Solutions, the municipality deploys fiber-optic conduits simultaneously with the newly installed sewer system, conduits that can then be leased -- via Renaissance -- to carriers and other service providers.

The municipality's share of the access fee revenue from providers can then offset some or even all of the cost of rehabilitating the sewer system (Figure 3). In addition, the city's commercial and residential citizens receive access to additional value-adding services that improve the quality of life and make the municipality more attractive to new commerce.

Figure 3
HYPOTHETICAL ONE-YEAR, ONE MILLION FOOT BUILD IN MAJOR U.S. CITY



For telecommunications service providers, Renaissance lowers the significant cost barrier for widespread commercial and residential to-the-building fiber deployment. With the "open access" model developed with each municipality, Renaissance leases fiber-optic access at competitive fees to service providers. The result is the ability to reach new customers faster and more cost effectively, with much fewer provisioning or administrative steps and with the ability to rapidly deploy next-generation broadband services -- but with minimal investment exposure or capital expenditure. The

opportunity for carriers to only pay an access fee when they sign up a customer greatly reduces the barrier to entry for competitive carriers and provides tremendous potential cost savings for incumbents.

"The dual-purpose rehabilitation solution completely disrupts the economics of both telecom last-mile fiber deployment as well as the municipal economics of sewer rehabilitation," Paletta says. "For last-mile fiber access, we truly believe that this technology changes everything."

For more information about Renaissance Integrated Solutions and their dual-purpose rehabilitation technology, visit them online at www.rensols.com. You may also contact Stephen Schoffstall at 203-431-1600, or via e-mail at steve@rensols.com.

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Technology

- [Renaissance Integrated Solutions](#)

Analysts and Reports

- [David Isenberg of isen.com](#)
- [Broadband: A 21st Century Technology and Productivity Strategy, by Sen. Joseph Lieberman](#)

Agencies

- [Environmental Protection Agency – Office of Wastewater Management](#)