Science & Technology
In search of
Salvaging
The Bell Labs Holmdel facilities

Creating Eureka-Holmdel

Question: Would it be possible to create a "real" life, small town geared purely to promoting research and development and leveraging the rich history of Holmdel's Bell Labs facility, a concept similar to the fictional village depicted on the show "Eureka" (a SCIFI Channel TV series)? Such a "village" could be created using the old Bell Labs facility as an anchor thereby building an exciting mixed- use project without expanding the scope beyond that of the existing building footprint and entrance roadway. This unique site located in Holmdel, NJ is perfectly suited for this type of development, historically as well as from a land-use and planning perspective. Imagine, using the lab facility as a "thematic" centerpiece for the establishment of a "quaint", village whose focus would be the binging together a true "Community of Interest" comprised of scientists, engineers, both senior as well as entry level as well as their families. A project of this type could also serve to attract small startups as well as existing, large, technology-based companies wishing to co-locate in much the way companies were attracted to the Silicone Valley. The Bell Lab facility with its mature and natural architectural landscaping could be further enhanced to create a shielded environment designed with the community –at-large in mind. Strategically placed landscaping enhancements would create a low impact development capable of providing a wide range of housing, accessible labs, inexpensive office space, a thematic technical/science oriented library and other amenities, all designed to encourage the establishment of a science & technology enclave. This approach could provide an interesting community center of which the entire town, county and even the region could benefit.

The project could even boast a modest "Main street" designed to enhance the sense of community, complete with collection of small shops and boutiques, thematically recruited with the intent of creating a truly self-contained and livable, low impact community. This community can be created centering on the theme of "working where you live and living where you work". The site would be designed to be a "low impact" development, one where bicycling, walking and socialization would be encouraged. By design, the "village" encourages working close to where one would spend leisure time. Among other benefits that this approach represents would be to the community, the county and the state is its innate ability to create jobs thereby stimulating Economic Development and becoming a "center of gravity" for continuing pure R&D within the county.

As designed, the theme of the project is to attract; scientists, engineers, professionals and even students, thereby creating a homogeneous community available to companies doing

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advanced R&D and who may wish to remain in the area even after Fort Monmouth and Lucent close their operations. Such a structure would hold great interest to the members of the academic community as well. This "Community of Interest" could be attracted to the village much the way a moth is attracted to a flame. The rationale for a community such as envisioned coming together would be for the express purpose of pursuing Research and business development. Thematically, the approach leverages that work that has been done by the original Bell labs for over the past 60 years.

As stated earlier, the village design could accommodate a main street lined with trees, a village square extending from the main entrance water tower all the way to the lake located in front of the main building. This park-like setting would accommodate garden paths, walkways, benches, picnic tables and bicycle paths, facing small shops and boutiques lining both sides of the common. Again, the theme of the village is that you work where you live, live where you work, thus creating a truly livable community geared to Science, Technology and, Innovation. With the focus being on the theme of the project, the design would be geared to accomplishing a number of critical goals and objectives such as minimizing impacts on local traffic, upgrading infrastructure (i.e., sewer and utilities and, the local school system if necessary). Project objectives:

- *Attract tenants wishing to use the existing lab facilities*
- *Create an environment designed to encourage collaboration and co-location*
- *Create a "Community of Interest" – i.e., academic/commercial Research & Development*
- *Promote Economic Development and Job Retention*
- *Leverage the Historical aspect of the Bell Labs facility*
- *Preserve and enhance Open Space*
- *Stabilize and reduce municipal taxes*
- *Upgrade Municipal facilities and Infrastructure*
- *Leverage technology for traffic mitigation*
- *Work collaboratively with county and state – SMART GROWTH*

The Facility:

View from the Atrium

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The Bell Labs facility and site is an ideal location lending itself to mixed land-use, low impact development. Thematically, the site is well suited for creating a community whose primary focus could still be pure Research and Development. A "Green-fields" design approach could create a dynamic project, building on the Lab's rich history and strong historic impact on the world of science and technology. Leveraging its pedigree for pure R&D and the host of technologies developed locally, it seems to be a natural to become a "next generation" research center. There is a ready made base of human capital available to continue on its rich tradition of pure research and development. Its rich history is not only important to Holmdel and Monmouth County but also the world. With this historical perspective strongly linked to Innovation, a Bell Labs Village Center becomes a great jumping off point for returning science and technology to its place as the county's cornerstone of economic development, innovation and job creation. With the town of Holmdel taking a leadership position along with support from county offices (i.e., Department of Economic Development, the County Planning Board and Board of Chosen Freeholders, etc.) as well as offices from the state (i.e., Science & Technology Commission, EDA, NJTC, etc.) and other regional consortia, a great opportunity and, a narrow window of opportunity currently exists. The caveat is that the window of opportunity will soon be closing on this facility. This time next year, its use will probably have been formalized.

Issues such as this were topics of the recent Economic Development Summit championed by Freeholder Anna Little and the Monmouth County Department of Economic Development and Tourism. An initiative such as a Eureka-Holmdel represents what could become a centerpiece for local economic development and smart growth within the county and region. Issues such as; R&D, job creation/retention, impacts of job losses associated with the closures of Fort Monmouth and the Lucent Technologies, need to be addressed, and addressed soon! A Bell labs component should be viewed as a part of an overall solution designed to address the negative economic conditions soon to be impacting the county. This approach also focuses on how the public might be "educated" so that there is a greater understanding of how innovation (i.e., R&D) could become an integral part of any comprehensive overall solution.

Basis for this synopsis is loosely tied to the TV show Eureka - SCIFI Channel storyline)

Premise of the SCIFI Channel EUREKA, TOWN HISTORY

As World War II came to a close with mushroom clouds over Hiroshima and Nagasaki, the impact that science and technology had on the continuing security of our world became almost catastrophically apparent. America very nearly lost the race to build the atomic bomb to Germany; it could not risk such a close call again. Therefore, the town of Eureka was conceived.

With the help of Albert Einstein and other trusted advisors, President Harry S. Truman commissioned a top-secret, Manhattan-like project to be created in a remote area of the

Pacific Northwest, one that would serve to protect and nurture America's most valuable intellectual resources. There, the nation's greatest thinkers, working on the next generation of scientific achievement, would be able to live and work in a supportive and collaborative "home town" environment. In order to create this haven for scientific achievement, the best architects and planners were retained to design a nurturing and welcoming "place" for scientists and engineers. The plan was to attract the nations best and brightest in their various scientific disciplines. The thought was that they would wish to reside in this unique, family oriented center of technology development whereas the creative juices would flow. Part of the plan according to the storyline, was also to create a self-contained community that it would offer the best education for the children of these scientists and engineers, along with the best healthcare and other amenities with which to enhance the quality of life for all its inhabitants. Eureka would become a community created to rival the most idyllic of America's small towns — with one major difference: this town as designed, would attract a research focused community coming from all walks of life to co-locate in order to promote discovery and innovation.

Note: The Holmdel, Bell Labs facility currently occupied by Lucent would make the ideal anchor for such a "Village Center" creation. Such a structure, by definition would attract many recent college graduates including; Post Doctoral students, engineers, scientists and other professionals. Its creation could also serve to energize the participation of technology-based retirees who have decided after retirement to remain in this area. Finally, it would also encourage greater participation of academic institutions, both locally as well as throughout the state. A "Eureka" Holmdel could in fact become a powerful catalyst for the creation of a county-wide Innovation Zone (similar in many respects to the original Silicone Valley) thus attracting people from all over, to move into a village whose sole theme and purpose would be that of technology and innovation. Finally, as was in the case in the past, people who moved here embraced the "livability" and benefits of living in Monmouth County. There are still compelling and ample reasons for people being "here" as opposed to "there". Monmouth County has its beaches, its quality of life and, its proximity to NYC and Philadelphia. In order to preserve these assets, it has become necessary to start thinking out of the box in order to build the next overlay that will enable the county to maintain its pre-eminence in the nation.

As with Eureka, a "Eureka" Holmdel could be created becoming an almost completely self-contained community including a specialized Technical Library, subscription labs, a housing component (including "affordable", age-restricted and market). The architecture could be designed around a theme of perhaps a small New England village. The village component itself would be designed around a town square, thus providing ample open space and promoting livability second to none. This also creates a social gathering place outside of work and school. As envisioned, the village would not accommodate any "big box" or chain type stores per se but would market to a local clientele. The entire project would be built around and designed to leverage the existing 1.6 – 2mm square feet of the original Bell labs buildings. Minimal modification should need to be made, the goal of keeping the rental costs to a minimum while still allowing a normal ROI for the investor.

This could serve to keep the costs per square foot low even with some of the perceived shortcomings associated with the buildings construction and systems. By keeping costs contained the savings may then be passed on to targeted and recruited organizations that in turn would create the underpinnings of an appropriate "Community of Interest". By building this Community of Interest and, by making existing facilities viable at a reasonable cost, the buildings original intent and use could be preserved. This in turn would encourage co-location in the facility and, by default, collaboration. The net result could be the building an Incubator-like organization that would naturally come into existence because of shared interests.

This approach incorporates many familiar, small-town trappings, into a hamlet that would be anything but ordinary. It would also be a winner from both the community's perspective as well as the developer's. It creates the opportunity of a win-win-win situation.

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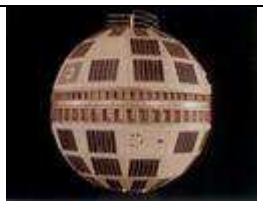
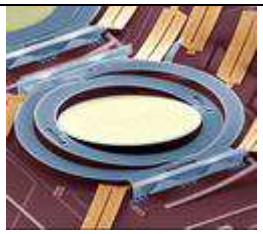
As with the focus of the storyline, Eureka-Holmdel could become an Incubator for future "quantum" leaps in science and technology, much the same as the original Bell Labs enjoyed for over 60 years. Below, please note the accomplishments of the fictional Eureka on the left hand column with the "real" Bell Labs accomplishments (the ones that we know of anyway) on the right. Comparison is as follows:

Eureka Inventions – TV show:	AT&T Bell Labs – Inventions - Holmdel
 DVD Hologram Projector Watch your favorite films in full 3-D glory, the way they were meant to be experienced. With a "Holomex" DVD Hologram Projector. Accepting both standard DVD discs as well as specially designed Holodiscs, the Holomex can create 3-D holograms from standard 2-D films or project holographic images straight from a disc.	**1940 - Ohl discovers that impurities in semiconductor crystals create photoelectric properties** Russell Ohl, a researcher at Bell Labs, discovers that small amounts of impurities in semiconductor crystals create photoelectric and other potentially useful properties. When he shines a light on a silicon crystal with a crack running through it, a voltmeter attached to the crystal registers a half-volt jump. The crack, it turns out, is a natural P-N junction, with impurities on one side that create an excess of negative electrons (N) and impurities on the other side that create a deficit (P). Ohl's crystal is the precursor of modern-day solar cells, which convert sunlight into electricity. It also heralds the coming of transistors.
 Plasma Screen Interior Walls Step into the third dimension of television with Plasma Interior Walls. Custom-fitted to the room of your specifications, the PIWs will truly immerse you in your favorite programming. You can choose to watch different programs on each wall, stretch out one program to cover multiple walls, or view multiple-angle DVDs designed to put you in the center of the action.	**1947 - First pointcontact transistor**   Inventors of first transistor at Bell Labs in December, 1947 John Bardeen, Walter H. Brattain, and William B. Shockley of Bell Labs discover the transistor. Brattain and Bardeen build the first point contact transistor, made of two gold foil contacts sitting on a

	germanium crystal. When electric current is applied to one contact, the germanium boosts the strength of the current flowing through the other contact. Shockley improves on the idea by building the junction transistor—"sandwiches" of N- and P-type germanium. A weak voltage applied to the middle layer modifies a current traveling across the entire "sandwich." In November 1956 the three men are awarded the Nobel Prize in physics.
 xMac Roll-up Personal Computer The xMac is a quantum leap in portability over the laptop. Just 1 millimeter thin, the 20 x 14-inch sheet includes an 18-inch monitor and CPU — all built out of flexible plastics and alloys so you can roll it up into a 14-inch-long cylinder. When you unroll it, the xMac automatically goes rigid (thanks to special polymers) and engages the kickstand.	1954 - **First truly consistent mass-produced transistor is demonstrated** Gordon Teal, a physical chemist formerly with Bell Labs, shows colleagues at Texas Instruments that transistors can be made from pure silicon—demonstrating the first truly consistent mass-produced transistor. By the late 1950s silicon begins to replace germanium as the semiconductor material out of which almost all modern transistors are made.
 eyePod Spy Satellite Tracker The days when your personal music collection and the security of your nation were handled by different devices are over. The eyePod is everything you want in a portable music player, with the added bonus of being able to view the live feed from any spy satellite in orbit.	1955 - **Silicon dioxide discovery** Carl Frosch and Link Derick at Bell Labs discover that silicon dioxide can act as a diffusion mask. That is, when a silicon wafer is heated to about 1200°C in an atmosphere of water vapor or oxygen, a thin skin of silicon dioxide forms on the surface. With selective etching of the oxide layer, they could diffuse impurities into the silicon to create P-N junctions. Bell Labs engineer John Moll then develops the all-diffused silicon transistor, in which impurities are diffused into the wafer while the active elements are protected by the oxide layer. Silicon begins to replace germanium as the preferred semiconductor for electronics.

 ThinkBack Memory Backup Drive Never forget anything again! After downloading every moment, dream, and experience you've ever had through the ocular interface (resembles a pair of goggles), the ThinkBack Memory Backup Drive stores them on a special hard disk, where you can review your memories on the LCD screen. Now you'll be able to call up the lyrics of a song you heard last week or relive that amazing weekend you had by the lake house.	**1965 - Automatic adaptive equalizer invented by Robert Lucky*** **The automatic adaptive equalizer is invented in 1965 at Bell Laboratories by electrical engineer Robert Lucky. Automatic equalizers correct distorted signals, greatly improving data performance and speed. All modems still use equalizers.** ***Chairman of the Economic Development and Base Reutilization Commission**
 Thought Messenger Earpiece Love text messaging, but hate punching in notes on your phone's keypad? The Thought Messenger Earpiece was made just for you! Reading your surface thoughts, the telepathic device will translate them into text messages, sending them to any contact in your cell phone's address book that you can think of.	1968 - **Bell Labs team develops molecular beam epitaxy** Alfred Y. Cho heads a Bell Labs team that develops molecular beam epitaxy, a process that deposits single-crystal structures one atomic layer at a time, creating materials that cannot be duplicated by any other known technique. This ultra-precise method of growing crystals is now used worldwide for making semiconductor lasers used in compact disc players. (The term epitaxy is derived from the Greek words *epi*, meaning "on" and *taxis*, meaning "arrangement.")
 Laptop Transporter Transport small objects vast distances easily with the Laptop Transporter X85. While other personal transporters may offer similar features, none offer cordless operation and long-lasting battery power like the X85. With a range of more than 4,000 miles (10,000 miles with the optional	**1969 – Ken Thompson/Dennis Ritchie – Unix operating system**  In 1998, Ken Thompson and Dennis Ritchie, of Lucent Technologies' Bell Labs, received the U.S. National Medal of Technology award for the creation of the

4,000 miles (10,000 miles with the optional range extender, sold separately), it allows one to send any small to medium-sized object across the country in less than two minutes.	Unix™ operating system and the C programming language.
 Short-Range Personality Scanner Inconspicuously hidden in a device no larger than a pen is your key to avoiding awkward social situations forever. The short-range personality scanner takes into account the primal pheromones, vocal tones, postures and movements of any individual within a 25-foot radius and gauges the person's mood and personality.	1980 - **First circuit boards that have built-in self-testing technology** Chuck Stroud, while working at Bell Laboratories, develops and designs 21 different microchips and three different circuit boards—the first to employ built-in self-testing (BIST) technology. BIST results in a significant reduction in the cost, and a significant increase in the quality of producing electronic components.
 Cell Phone Activated Exercise Automator Going to the gym is time-consuming, expensive and tiring work. Now you don't need to make such a sacrifice to stay in shape — your cell phone can do your workouts for you! The Cell Phone Activated Exercise Automator connects your phone to your skin with a small, unobtrusive electrode, allowing it to distribute a series of small electric shocks to your muscles.	1998 - **Plastic transistors developed** A team of Bell Labs researchers—Howard Katz, V. Reddy Raju, Ananth Dodabalapur, Andrew Lovinger, and chemist John Rogers—present their latest findings on the first fully "printed" plastic transistor, which uses a process similar to silk screening. Potential uses for plastic transistors include flexible computer screens and "smart" cards, full of vital statistics and buying power, and virtually indestructible.
 TemporalVision Monitor Is the wait for the new season of *Lost* slowly killing you? There's no waiting with the TemporalVision Monitor — just use the special +/- Time buttons on the remote to advance the day, week, month or year to tune into the yet-to-be-produced show you	 Bell Labs' Robert Wilson and Arno Penzias, 1978 Nobel Prize winners for their discovery of the "Big Bang" theory of the universe's creation, at the famous Horn Antenna in Holmdel, NJ

want to peek in on.	
	 Bell Labs Telstar, the world's first communications satellite
	 A close-up of an individual micro-mirror from Lucent Technologies' LambdaRouter™, the world's first all-optical switch
	 Bell Labs' Dave Bishop holding a chip from Lucent Technologies' LambdaRouter™, the world's first all-optical switch

The following are excerpts from Bell Labs History site

The facility in question, one time Holmdel, New Jersey home to Bell Labs -- one of the most prolific technology innovators of the 20th century – has been owned by Lucent technologies until a recent round of asset liquidations. Barely 40 miles out of New York City, in its heyday the six-story, two million square foot campus, employed over 5,600 people who toiled away in its bowels; it became home to the work of numerous Nobel laureates, and has long since been cemented in the annals of tech history as the birthplace to some of the most important communications technologies ever conceived. And it'll soon be torn down.

Designed and erected between 1957 and 1962 by the inimitable and infamous Eero Saarinen, Holmdel is former home to Bell Labs' optical transmission, microwave, and wireless work, including the High-Speed Networks Research Department, High Speed Mobile Data Research Department, and Data Networking Systems Research Department. It was Holmdel's Wireless Research Laboratory, however, and the work Richard Frenkiel and Joel Engel that ranks among all Bell Labs' most notable contributions. In the early sixties Frenkeil and Engeld led a team of over 200 engineers to develop the first cellular wireless voice transmission technology, and eventually created AMPS (Advanced Mobile Phone System), the first and one of the most widely deployed cell phone technologies (still active even today in many parts of rural America). Holmdel is effectively the birthplace of global wireless movement, possibly the most crucial communications development of the 20th century, the Internet notwithstanding. But there's more. Lots more!

Before the current facility was erected, Harald Friis' work at Holmdel in 1938 produced one of the first microwave communications and RADAR systems, which was utilized by the US in World War II to defend against enemy munitions; Friss also worked closely with Bell Labs scientist Karl Guthe Jansky at Holmdel, who developed there the rotating antenna (aka "Jansky's merry-go-round") and was credited in 1933 with the discovery of the science of radio astronomy. This, in turn, gave birth to the research and work of two later Holmdel scientists, Arno Penzias and Robert Wilson, who in 1964 used the Bell Labs' infamous horn antenna (above) to lay the scientific groundwork for a little something we call the "Big Bang Theory" (for which they were jointly awarded 1978 Nobel Prize in Physics).

We could go on about Holmdel's technological contributions, from Linn Mollenauer's groundbreaking work in the development of multimode fiber transmission systems and Andrew Chraplyvy's, Kenneth Walker's, and Robert Tkach's invention of optical fiber for dense wavelength division multiplexing (DWDM) -- some of the technologies which now enable the fiber optic backbone of today's internet infrastructure; to the lab's direct contributions to Telstar, the first communications satellite, which prompted President

Dwight D. Eisenhower to send a message of his own into space by way of Holmdel; to Jerry Foschini's BLAST technology (1998), the original precursor to MIMO wireless transmission systems; to Steven Chu's Nobel Prize-winning work in cooling and trapping atoms with lasers; to Arthur Schawlow's and Charles Townes' 1958 invention of the frickin' laser. But somehow we think you get the point.

Bell Labs has played a pivotal role in advancing communications technologies. Here are some of our key innovations.

2006 Bell Labs reports the first optical transport of electronically multiplexed 107 Gigabit per second (Gbps) data over a distance of 2,000 km.

Lucent introduces **Base Station Router**, a Bell Labs innovation that integrates key components of third-generation (3G) mobile networks into a single network element, thus "flattening" what is typically a more complex architecture.

Bell Labs reports the first optical transport of electronically multiplexed 107 Gigabit per second (Gbps) data.

The **Bell Labs Security Framework** is used as a basis for the ISO standard 18028-2, a comprehensive approach for ensuring network security.

2005 Bell Labs introduces the **IMS Service Enablement Layer**, a library of technologies that work across wireless and wireline networks to simplify and speed delivery of services, enabling converged network operators to create and deliver simple, seamless, secure, portable, and personal multimedia services to their subscribers.

Bell Labs introduces **SmartPON™**, a module design that enables operators to support both GPON and EPON standards on the same platform, and can be modified easily to address changes in the standards, new service requirements, different upstream and downstream line rates up to 2.4 Gbps (symmetric), and multivendor interoperability challenges.

Bell Labs and mPhase Technologies unveil a prototype for the **first working nano-based metal detector**, which could theoretically be 1,000 times more magnetically sensitive than currently available comparable solutions.

Bell Labs reports the first transmissions of **100 Gigabit per second (Gb/s) Ethernet over optical**.

2004 A joint R&D team of Bell Labs and mPhase researchers prove the feasibility of **nanotech-based batteries** that can store and generate electric current.

The **Bell Labs Security Framework** is adopted by the ITU as ITU-T Recommendation X.805 — a comprehensive approach to proactively combat security threats including hackers, viruses, worms and a steady stream of software patches.

Bell Labs invents **"nanograss"**, a new method to control the behavior of tiny liquid droplets by applying electrical charges to specially engineered silicon surfaces that resemble blades of grass.

2003 A team led by scientists from Bell Labs builds a novel **semiconductor laser based on a photonic crystal**, a highly engineered material with superior optical properties. The device may have numerous applications, ranging from advanced optical communications to sensitive chemical detectors.

Bell Labs and its collaborators discover that a **deep-sea sponge contains optical fiber** remarkably similar to the optical fiber found in today's state-of-the-art telecommunications networks.

Bell Labs earns its **30,000th patent** (since 1925) — a method to solve VoIP congestion by creating virtual trunk groups over which information can flow between senders and receivers without interruption.

2002 Bell Labs introduces the world's first semiconductor laser that emits light continuously and reliably over a broad spectrum of infrared wavelengths.

Bell Labs introduces **network security software** that makes the process of logging into network-based services and applications easier and more secure without sacrificing user privacy.

The **New Jersey Nanotechnology Consortium** (NJNC) is created by the State of New Jersey, the New Jersey Institute of Technology and Lucent Technologies to conduct research, develop and prototype devices and systems, stimulate new business and growth, commercialize nanotechnology concepts and train more nanotech scientists and specialists.

Bell Labs scientists transmit 64 channels of data at 40 gigabits per second per channel over 4000 kilometers (2500 miles). This achievement doubles the distance record for high-bandwidth, ultra long-distance transmission.

2001 SuperHLR (home location register)**, software breakthrough that will enable global roaming across all wireless network types.**

First calculation of theoretical limits of fiber optic communications

First commercialization of "smart antenna" technology for cellular base stations **(BLAST)**

Tripling the capacity of wireless communications using electromagnetic polarization.

First Plastic Superconductor **could be widely used in the future for applications such as quantum computing and superconducting electronics.**

First all-silicon radio-receiver chips for cellular base stations **could reduce the size and cost of base stations**

2000 First plastic, flexible electronic paper prototypes**, co-developed with E Ink.**

First DNA machines. **The techniques used to make the machines may lead to computers that are 1,000 times more powerful than today's machines.**

Electronic circuit that mimics the brain's circuitry

Progressive geometry compression algorithm**, 12 times more efficient than standard approach, makes widespread 3-D communication practical.**

First electrically powered organic laser.

First large-scale map of cosmic dark matter.

Super-fast quantum algorithm for intelligent database searches.

First high-density speech server**, using Bell Labs speech technology and VoiceXML to provide voice access to Internet content and services.**

F-15**, a novel organic material making plastic transistors feasible.**

World's first triple-terabit long-distance data transmission**, sending 3.28 trillion bits per second over optical fiber.**

1999 Raman Amplifier**, a device that boosts the signal in an optical fiber by transferring energy from a powerful pump beam to a weaker signal beam. They disrupt the data carried by light much less than other methods of**

amplification do, thus eliminating costly equipment used to correct the signals. Raman amplifiers are used in almost all the current-generation ultralong-distance systems

First high-capacity, all-optical communications router**, capable of directing 10 times the traffic of today's Internet.**

First high-speed lightwave communication system that transmits laser pulses directly through the air, rather than through optical fibers**.**

Softswitch**, the first software switch for Internet Protocol (IP) networks, combining the reliability and features of a public telephone network with the cost-effectiveness and flexibility of the Internet.**

First commercially available L-band optical amplifier**, enables network operators to transmit traffic through a previously unused frequency, thereby significantly expanding the capacity of fiber-optic networks.**

Most wavelengths ever carried on a single fiber (1,022)**,each carrying a distinct stream of information.**

Most sensitive geolocation technology **for pinpointing the location of wireless 911 calls. Accurate within 15 feet.**

1998 World's smallest video camera**, on a silicon chip the size of a postage stamp.**

First optical router**. Combined free-space optics and microscopic mirrors to route and switch individual wavelengths, or colors, of light simultaneously on an optical fiber.**

First combination of voice and data traffic on an Internet Protocol (IP) network**. Using the PathStar Access Server, this let communication service companies offer both cheaper voice services, like caller ID, and faster Internet access.**

First long-distance transmission **of one terabit (trillion bits) of data per second over a single strand of optical fiber.**

First plastic transistor **for use in flexible computer screens, smart cards, intelligent luggage tags, electronic paper, and more.**

1997 World's smallest practical transistor **-- only 60 nanometers, or 182 atoms wide.**

1996 SCALPEL **uses electron beams to print features just 250 atoms wide on microchips.**

Elemedia(TM) **software , for high-quality speech and music over the Internet.**

1995 First demonstration of wireless internet access**.**

Software technology for voice access to the Internet**, including the Phone Web architecture, Mawl middleware, and Phone Markup Language, a precursor of VoiceXML**

First commercial DWDM (dense wavelength division multiplexing) lightwave system**, sending digitized information over multiple wavelengths, or colors, of light.**

1994 Quantum cascade laser**, the world's first semiconductor laser to operate in the mid- and long-wavelength infrared regions at room-temperature**

1992 Revolutionary magneto-optic technique **stores 45 billion bits of data per square inch, using near field scanning optical microscopy developed at Bell Labs.**

First fault-tolerant software **components that kept faults from shutting down a program.**

Digital radio technology **allows AM and FM stations to broadcast near-CD quality music.**

1991 56 kilobits per second modem technology**, which in the late '90s brought faster Internet access to many Personal computers.**

1990 First wireless Local Area Network (LAN)**.**

First optical digital processor**. An experimental machine that processed information with light rather than electricity.**

1989 Perceptual Audio Coder (PAC)**. Compresses music, voice and other signals into lower bit rates for easier transmission.**

Digital high-definition TV software **based on video compression algorithms.**

1988 First fiber-optic transatlantic cable **linking North America and Europe with a 3,148-mile cable that could handle 40,000 telephone calls simultaneously.**

1986 Erbium-doped fiber amplifiers **boost signals, reducing the need for traditional optoelectronic repeaters, and generally improving network performance.**

1985 Laser light used to slow and manipulate atoms **by Steven Chu and his**

colleagues at Bell Labs. Laser cooling is now used to investigate the behavior of atoms, providing an insight into quantum mechanics (Nobel Prize awarded in 1997.)

1984 First transmission at rates above 1 gigabit per second **using optical communications technology.**

Karmarkar Linear Programming Algorithm**, developed by mathematician Narendra Karmarkar, enabled computers to economically solve incredibly complex problems involving thousands of interacting variables.**

First megabit memory chip**.**

1983 C++ language**. Made reusable code easier to write.**

1982 Fractional quantum Hall effect**, discovered by Horst Stormer of Bell Labs and two former Bell Labs researchers, Robert Laughlin and Daniel Tsui, revealing a new state of matter created when electrons come together to form quasi-particles with fractional electrical charges. (Nobel Prize awarded in 1998.)**

1981 First long-distance lightwave communication system**, connected Boston, New York and Washington, D.C.**

1980 Digital cellular telephone technology**, offering better sound quality, greater channel capacity and lower cost than analog.**

1980 First use of formal methods **to test and mathematically verify that no fatal flaws lurk among the countless logical states in a chip design or in a software system.**

1979 First single-chip digital signal processor (DSP) **laid the foundation for today's cellular phones and modems.**

1978 First single-chip echo canceller **improved sound quality in telephones and eliminated undesired humming and echos.**

1978 First service trial of Bell Labs-developed cellular system**, Chicago.**

1977 First commercial installation of Bell Labs-developed fiber-optic lightwave communications system **installed under the streets of Chicago.**

1976 S language **for statistical computing and data visualization.. Today the S system is used to manage the code development of multimillion-line software**

and to optimize the manufacture of optical fibers and integrated circuits.

1976 First experimental lightwave communication system test**, Atlanta.**

1972 C programming language**. Combined powerful logical instructions with the ability to manipulate individual bits and characters in the computer without using machine language.**

1970 Orthogonal frequency division multiplexing (OFDM)**, a technique for modulating wireless signals that is considered to be the cornerstone of the next generation (4G) of high-speed wireless data products and services.**

1969 UNIX operating system**, invented by Ken Thompson and Dennis Ritchie. A simple but elegant time-share software system for computers. The first software system designed to run on computers of all sizes making open systems possible. UNIX later became the foundation for the Internet.**

First token ring network **is based on an architecture in which PCs on the network pass data around a ring of nodes or stations.**

1968 Molecular Beam Epitaxy**. Enabled semiconductor chips to be made one atomic layer at a time, opening the door to vast improvements in chip manufacturing.**

1965 1 ESS® Switch **was the first electronically controlled central office switch.**

Background radiation from the Big Bang discovered **by Arno Penzias and Bob Wilson. (Nobel Prize awarded in 1978)**

1964 Automatic equalizers**. These circuits reshape distorted signals, greatly improving data performance and speed. Today they are built into most high-speed modems.**

1964 Carbon-dioxide laser**. The most powerful continuously operating laser now used worldwide as a cutting tool in surgery and industry.**

1963 Touch-tone telephone**, with push buttons instead of a rotary dial. Ushered in a new generation of telephone services and capabilities.**

1962 Light-emitting diodes (LEDs)**. Used practically everywhere from traffic lights to scientific imaging systems.**

First paging system **test, Seattle World's Fair.**

Cellular technology **demonstrated to the United States Federal Communications Commission.**

Telstar I**, the first orbiting communications satellite.**

Foil electret microphone**. Ninety percent of the world's microphones now use this high-quality, rugged, inexpensive design.**

T1**, the first digitally multiplexed transmission system for voice signals.**

1958 Laser**, described in a technical paper by Arthur Schawlow and Charles Townes.**

1957 First demonstrations of digitized music and computer-synthesized music**.**

1956 First transatlantic telephone cable**.Handled up to 36 simultaneous calls.**

1954 Solar battery cell**. Converts sunlight directly into electricity. Cells now power satellites, heat homes, and more.**

1951 Direct distance dialing**. Enabled customers to dial long-distance calls within the United States without operator assistance.**

1949 First long-distance remote operation of a computer**. Took place when a teletypewriter in New Hampshire was connected to a computer at Bell Labs, New York City.**

1948 Information Theory**. Claude Shannon quantified "information" and gave engineers a math-based theoretical maximum information carrying capacity for any communications system.**

1947 Reuse of radio frequencies among hexagonal "cells" **conceived, leading to cellular communications.**

Transistor**, developed by John Bardeen, Walter Brattain, and William Shockley, replacing vacuum tubes and mechanical relays and revolutionizing the entire electronics world. (Nobel Prize awarded in 1956.)**

1946 First commercial mobile telephone service**.**

1939 First binary digital computer**. The Complex Number Calculator performed mathematical operations in binary form (using on-off relays) and could find the quotient of two eight-digit numbers in 30 seconds.**

1937 First electronic speech synthesizer **recreated human speech.**

1933 Live transmission of stereo sound **from Philadelphia to Washington D.C.**

1927 First long-distance television transmission**. Live television images of Herbert Hoover are sent over telephone lines from Washington, D.C., to New York City.**

1926 First synchronized sound movies**. Sound for a motion picture was recorded on wax disks then replayed on a large turntable connected to a synchronized film projector.**

1925 Systems Engineering**. A disciplined approach to evaluating technical innovations in terms of feasibility, need, compatibility with other systems, alternatives and economic implications. First applied to the expansion of the U.S. long-distance network, later NASA used it for the early Mercury launches and the 1969 Apollo mission to the moon.**

1925 First public demonstration of facsimile **transmits pictures over telephone wires.**

First high-fidelity sound recording**. Extended the reproducible sound range by more than an octave on the high and low end.**

Property of Somerset Development - http://www.sdnj.com/contact/

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Examples of the type development that could be employed in creating the Eureka-Holmdel village center:

This example is a village center located in Middlesex County – NJ. Note the livability created by the use of open space. This type of open space could also be created by running from the road (main entrance) up to the lake in front of the labs facility.

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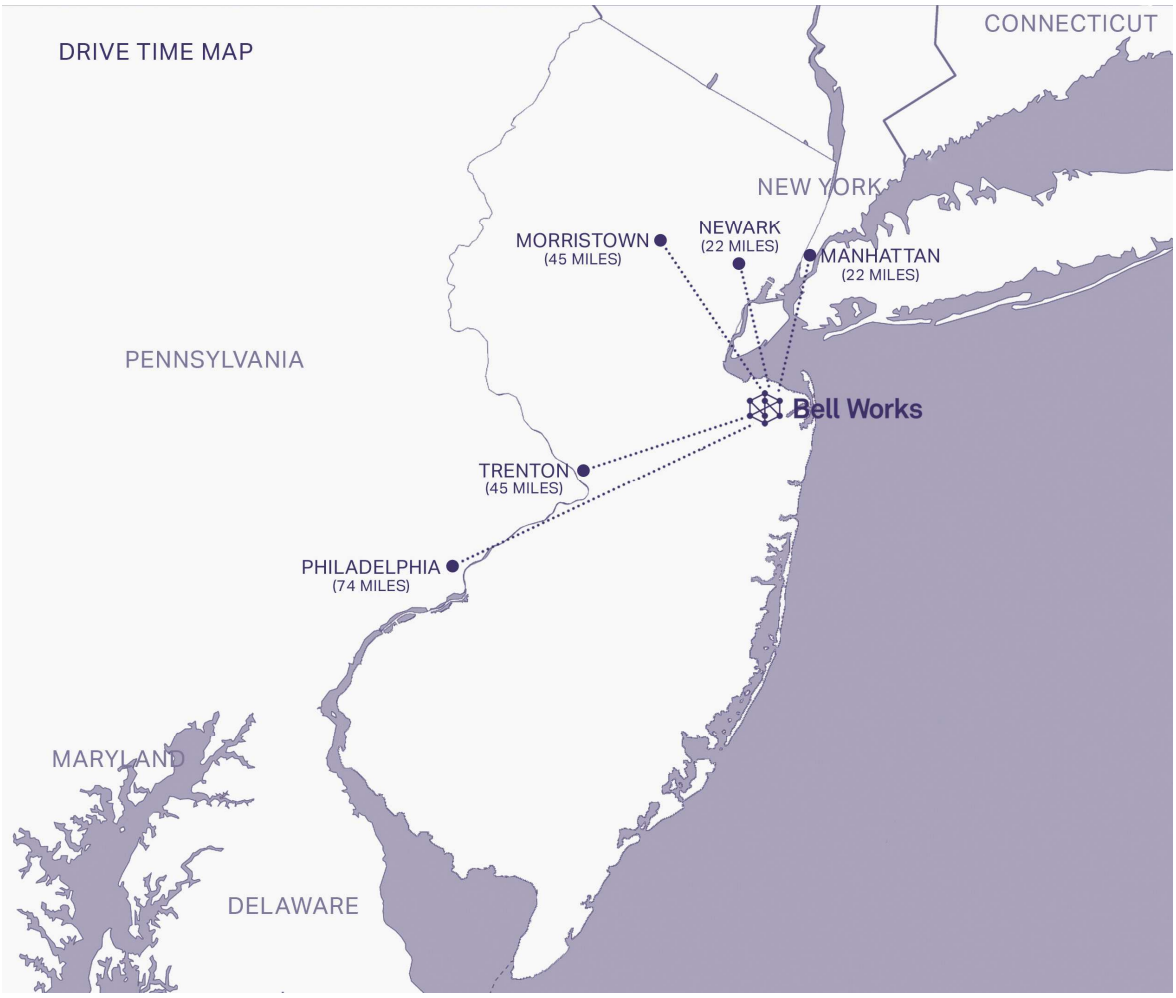

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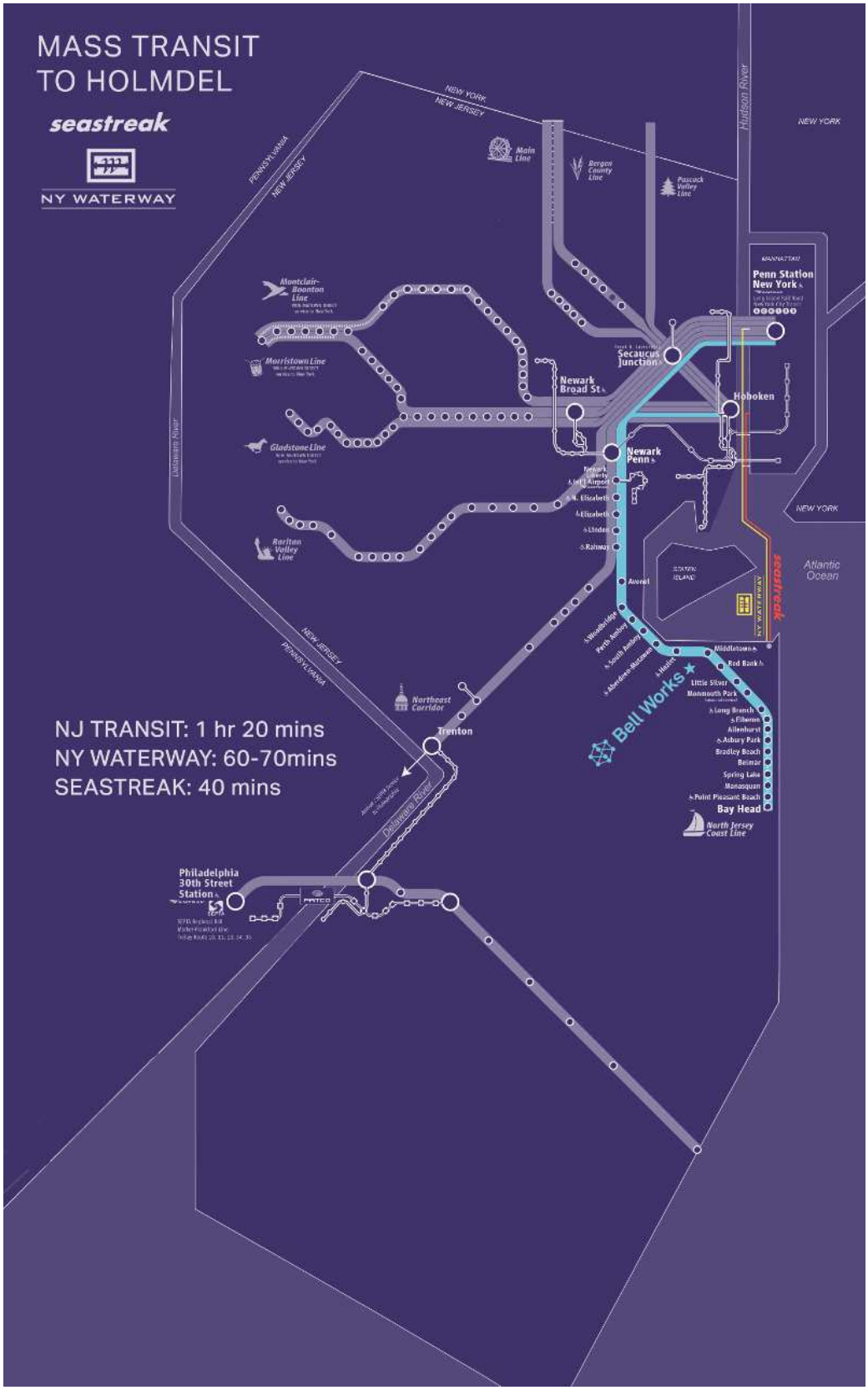

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Land Use and Development Concepts - Land use is influenced greatly by the Knoxville-Knox County-Farragut Growth Policy Plan. See example of village Center plan:

Mixed Use
In this case, land use is not rigidly separated, and uses that are compatible but not necessarily similar may locate together in the same general area, or in the same building. Often, shops are developed at sidewalk level with apartments or offices above. Parking lots include trees and landscaped islands, allowing for safe pedestrian travel.

Village Center
Neighborhoods are created around a village center so people can walk to centrally located schools, public space and shops. Public buildings are prominent, fostering civic pride. Public open spaces provide areas for athletics, play and community events. Apartments, townhouses and offices are located near the center, providing customers for the retail space and a transition to less intense housing.

For the Bell Labs facility, an additional overlay is available thanks to the history of the site, the large number of people that have a knowledge of the facility and, what it has meant to the world. This allows for a unique marketing opportunity to be used to build the community as envisioned. The only issues would be the promoting the concept to the community and granting variances for the mixed uses (i.e., residential/retail).

Additional units such as these townhouses (Celebration – Florida) could also be built around a town square, close to the shops thus creating a friendly community, brought together through the theme of the site, that being Research & Development, and technology.

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From a design perspective, this project is not only do-able, but also the optimum use of the site. It brings together all aspects of good planning including livability, utility, economy, security and economic viability. The site is uniquely suited to this type of development and would in all probability, be the easiest to promote. By building upon its "natural" theme, leveraging a ready made workforce (past and present) and addressing the concerns surrounding the potential loss of high tech jobs because of BRAC and the closure of Bell Labs (Lucent), this may provide the perfect foil at the perfect time to create what may become one of the most unique developments in the country.

Eureka – Holmdel, a "natural" Science & Technology "Innovation Zone" development!