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Introduction

Five years ago, in the summer of 2003, I launched a business that I called VENewNet (venue-net), with the understanding that the Hot Spots popping up around my hometown of Austin, Texas, were dramatically different. I recognized that any venue that added wireless broadband capability had changed its inherent potential to accomplish its business objectives. That's proven true for coffee shops, airports, airplanes, buses, commuter trains, even port facilities; and it's starting to show promise for communities. Admittedly, it's a non-traditional way of looking at mobile communications and broadband connectivity. It takes some getting used to.

In January 2004, I turned from the fragmented and nascent Hot Spot marketplace to cities and utilities, and over four and one-half years, I've grown my consulting business with the young industry, enjoying engagements with clients in virtually every aspect of this very new and still evolving industry. For those of us who have helped create this new market space, one of the challenges we're faced with today is how to define this industry, as it's recently been widely discredited by failed pioneer projects, many of which were launched amid hype and overconfidence.

In January 2006, I rejected the term "Municipal Wireless" when I relaunched my website and consulting practice under a new name, MetroNetIQ. Having retooled the six-month old website, UnwireMyCity.com, I believed at the time that defining the space by reference to city government-led initiatives was too limiting. Further, I'd seen successful fiber projects, which I believed to be equally valid, so "wireless" was too limiting as well. I recognized back then that "Community," "Metropolitan," and "Broadband" were more relevant terms. I've published over 750 blog posts in three years on a variety of topics related to these three terms and felt it was time to gather together my work into a book for a wider audience.

In this book I concentrate on three relevant, somewhat related terms. First, the title of the book refers to "Community Broadband," which connotes the mobilization of stakeholders from throughout a community to create a system that delivers broadband, which could be wired (FTTH, etc.), wireless (Wi Fi mesh, etc.), or both.

Second, the term "Digital Transition" in the subtitle refers to a process we all must go through in the coming decade - a steady adoption of digital tools and processes to take advantage of new technology options in order both to save money and to accomplish more. Those who move first will gain more experience sooner and benefit accordingly.

Third, the term "Metropolitan Broadband" envisions a greater coverage area for broadband, stressing the opportunity for communities to cooperate on a regional basis to lower risk, ensure interoperability and take advantage of economies of scale.

R.I.P. Municipal Wireless

1. **The demise of Big City Free Wi Fi ("Municipal Wireless"), when it finally happened, was a market correction long overdue.**
 - a. **Big Cities were the wrong place to start** to prove out unlicensed spectrum wireless. Too much risk too early, too many politics, too much competition among large incumbent ISPs, too much radio congestion, and too many licensed wireless alternatives.
 - b. **Free never made sense** - someone has to pay whenever there is something of value created. There are unavoidable capital and operating costs in any network project.
 - c. **The base of the industry was too narrow to meet the demands** - this industry has a long way to go, and there will be more service providers, network operators, and system integrators in time. But too much was riding in these early years on just a few companies. So when one major player (EarthLink) stumbled, everyone caught their collective breath. In the end, early industry development was flawed because it was driven by a single company in a difficult position.
2. **Public sector applications still need a wireless network.** Large cities should focus on applications and realistic solutions. Smaller cities should continue to engage with private sector providers and seek synergies. Sound business approaches to digital transitions based on implementing digital applications will be developed. We should study success as well as failure, and share success where we find it.
 - a. **Mobility** is still king - more and more field applications are needed.
 - b. **Infrastructure** demands support and more efficient management.
 - c. The march of **digital applications** goes on and **business process improvement** offers tremendous cost savings, but it will take work to make changes.
 - d. **Public Safety applications** in particular deserve attention because lower crime, disaster preparation and response and saved lives are three key reasons for city government.
 - e. The **Internet** will continue to disrupt the status quo for years to come.

R.I.P. Municipal Wireless (cont'd)

- 3. Rural Broadband is the biggest potential beneficiary of unlicensed wireless.** The low cost and modular nature of this technology make it ideal for low-cost, low-risk small projects, a great fit for underserved areas that still lack reasonably priced broadband alternatives, or any alternatives at all.
- 4. The Digital Divide demands creative, cost-efficient solutions and it will continue to get the attention of politicians.** But covering an entire city with a \$100 million unlicensed wireless network is overkill for distinct geographic segments of the city and population that face Digital Divide problems. It would be better to provide subsidies or point solutions, for instance. Big City Wi Fi was the wrong solution for Digital Divide, and the sooner we found that out, the better for all of us.

Instead of looking at Municipal Wireless and Wi Fi as a one-size-fits-all technology miracle-in-a-can, a realistic assessment would see it as but one tool in a toolbox that will enable creative solutions for some of our problems. Just as we shouldn't throw it away because of recent market corrections, neither should we try to turn it into more than it really is. We should value it for what it can do and make it a part of a more comprehensive approach to solving the need for Last Mile Broadband Infrastructure for all.

Taking the Plunge

As an experienced swimmer, I know the pattern of jumping into cold water and adjusting to the temperature over several laps. I also know not to jump into dark water, but to explore what lies beneath before proceeding. As a consultant, I've tested the waters of Community Broadband and Digital Transitions, and I'm here to tell anyone who will listen that "the water's fine, but you must proceed with caution."

If one is a beginning swimmer one understandably faces multiple trepidations. One overcomes such trepidations by taking swimming lessons and gaining experience in a controlled environment. A beginning swimmer forges ahead, with faith and courage, setting aside rational messages that swimming is dangerous, understanding that one has a wellspring of talent and skills that indicate success and a support network if something should go wrong. It's OK to stay in shallow water near the edge, until skills and confidence grow.

Lucky swimmers learned to swim when they were young, with parents right there to coax them along, and skilled instructors to teach them the

skills they'd need, and help them to develop those skills, providing confidence and guidance when they needed it most. Soon enough, they were off with their friends, swimming and having fun. Adults who try to learn to swim often must overcome a lifetime of fear of the water, which grew ever greater as basic survival instincts told them it was dangerous whenever they were near the water, since they had never learned how to swim.

The conclusion I draw from this analogy is that the benefits of initiative far outweigh the risks of taking on a new task, especially if the new task is an inevitable requirement of one's long-term objectives. In other words, if one has to learn something, one might as well get busy and start studying.

One of the hardest things to do is to start a new activity, especially if there are some risks attached (and aren't there *always* some risks?), and it's especially difficult if one is in the limelight. Nobody likes to make mistakes, nobody likes to play the fool, and nobody likes to admit their ignorance about something they're expected to know. It's human nature to be cautious, to avoid embarrassment, and that urge for caution goes up as the risk of a downside outcome increases. But there is also a risk posed by inactivity, and too often we underestimate the risk of maintaining the status quo, while overestimating the risk of taking on a new project.

It's often said, "There is no better teacher than experience." A few years ago, a city official at a round table on broadband expressed skepticism about Wi Fi and said that the municipal wireless industry was like a fast-rushing stream. He was waiting for the current to slow down a little before jumping in. While he avoided getting caught in the hype that followed, I think the time for waiting is over, because I don't think the current in this stream will *ever* slow down - my world view is that if anything, it will speed up as time goes on. We're in a period of disruptive change, thanks to the maturing internet, advances in digital computing, advances in mobile communications, etc., etc., etc. Technology advances and competition combine to create pressure on us all to adapt and move forward, even as the pace of change makes planning horizons ever shorter.

The choices we all face in this transitioning society are expanding over time and our decisions get *more* complicated, not less. To hope for a simpler decision is to delay taking a stand out of fear of making a mistake

- I believe that is fair and understandable, especially in this industry. The only solution I can think of is to get smart and to gain experience as quickly as possible.

The nature of metropolitan broadband is that it is complex and dynamic on at least three fronts - technological, political, and business - so it is going to be complex and risky, no matter what one does. This conclusion argues for taking steps to mitigate one's risk and allows one to get started sooner rather than later.

1. **Spend a little time in study, but not too much** - as with any new subject area, most of the gains come in the early stages, then the value curve gently flattens out and the more inputs made in studying a subject produce less and less value. Academic study only goes so far; at some point, time spent studying becomes "Paralysis by Analysis."
2. **Hire a consultant** - this is a way for a civic leader to buy immediate knowledge and experience, collapsing the learning curve, substituting money for time. Concerns over "wasting" money on a consultant can be allayed with a well-thought out Scope of Work.
3. **Identify possible negative outcomes and prepare for them** - talk to some other civic leaders with more experience, and ask them: "What worked and what didn't?" "What were the lessons learned?" "What would they have done differently if they had to do it over again?" "When did they know they were ready to act?"
4. **Start a small project with a short time horizon** - making the outcome less risky by design and bringing in results sooner than later both serve to accentuate the experience value of an initiative. A project will provide an opportunity to get several stakeholders involved, produce learning across the board, stimulate dialogue, build trust, and prepare everyone to take more and bigger steps.

If one recognizes that a) the situation will get more complicated over time; b) there are significant advantages to moving ahead; c) the risks of moving ahead can be managed; and d) the solution will only become apparent by trial and error; then there is no substitute to getting started by jumping in, or Taking the Plunge. In other words, it's no fun standing at the edge of the pool watching others splash and play because one can't swim. Just ask any kid who has learned to swim if they regret the decision. I think you know the answer. Then ask an adult who never learned to swim if they regret that omission. I think you know the answer to that question as well.

There's just no substitute for living life fully and for pushing out the envelope to be all that one can be, whatever one's role in life. The truth lies in the middle. For *inspiration*, remember these lines of wisdom: a) No Risk, No Reward; b) No Pain, No Gain; c) Nothing Ventured, Nothing Gained; and d) The Early Bird Gets the Worm. For *caution*, remember these: a) Fools Rush In, Where Angels Fear to Tread; and b) Pioneers End up with Arrows in their Backs.

Personally, I draw inspiration and guidance from [Stephen Covey's Seven Habits of Highly Effective People](#), whose quintessential habits are always lurking in the background as I write.

1. **"Be Proactive."** Take the Initiative. *Carpe Diem*.
2. **"Begin with the End in Mind."** Have your goals in front of you, know WHY you are doing what you are doing.
3. **"First Things First."** Make a plan and set priorities according to your values and objectives.
4. **"Seek First to Understand, Then to be Understood."** Listen first when you engage with others.
5. **"Practice Win/Win."** Look for solutions that are robust with multiple wins.
6. **"Synergize."** Set your goals high. Through creativity, find solutions that are better than compromise, solutions which leverage all that you bring to the table.
7. **"Sharpen the Saw."** Take the time to rejuvenate. Pause as you move forward to consolidate your gains, understand your Lessons Learned, and to Re-energize yourself and your team, for the new challenges that lay ahead.

For the past four years, in my role as an industry consultant, I've been studying the municipal wireless industry and trying on different business development models that might kick start this industry (and feed my consulting business) by solving some of the thorny issues that bedevil both the vendors and the communities. My approach to problem solving has always been to look for patterns that will simplify complexity.

While I'm not ready to raise the white flag in surrender (there's still more simplification possible), I have to acknowledge that we're unlikely to simplify things to a great degree anytime soon. I'd hasten to add that there are still some things we all can do to hasten progress, speed up the deal flow and raise the level of dialogue, but when it comes to

Community Broadband, we're quite simply bounded by unavoidable constraints. We're surrounded by walls, so we need to get busy building ladders.

So looking at this state of complexity and risk with regard to Community Broadband and Digital Transitions, I've got good news and bad news.

The good news: *Collectively, we're getting better and better at this.* As an industry, we know more than we ever have about how to do metropolitan broadband networks. Industry experience over the past four years - multiple business models, a growing bookshelf of case studies with many failures and some key successes, new lessons learned, aggressive entry by technology vendors, a maturing field of system integrators and service providers, declining technology cost curves, and a few of us ever-more-experienced consultants who continue to learn by doing - all that translates into dramatic improvement in the odds for success and lower risk for those communities interested in improving their prospects by going through a digital transition (and especially for those willing to listen to and act on good advice).

The bad news: *No matter what we do, going through a digital transition and acquiring and running a metropolitan broadband network will remain a complex process.* This is an industry based on a complex system of variables inside a three dimensional matrix along three axes: technology, business, and politics. Each of these axes provides a limited amount of wiggle room that will allow communities to drive out complexity and cost and lower risk. That's where MetroNetIQ and a select number of consultants in this new space come in. The good ones will show communities how to work the margins to improve their situation regarding technology, business, and political factors that still fall within their "Circles of Control."

Technology: Even as the options get better, they also multiply over time, adding complexity to the choices a community faces. Because it's a dynamic scenario, the situation becomes more complex over time, not simpler. And the fact that we are dealing with radio waves and spectrum means that the laws of physics and government regulation combine to create an incredibly complex scenario loaded with variables, and make some constraints unavoidable - network design and environmental management, to name a few.

Business: Which business model is best? Two years ago, it looked like the Municipal Wireless / Digital Divide model might work, but that has been thoroughly discredited over the past year. In the waning days of Municipal Wireless, the Public Private Partnership model with public anchor tenancy gained ascendancy. That model still has possibilities, but has real limits as well - only a very thorough business process improvement plan will make service rates affordable. The Municipally-Owned, but Privately-Operated model makes a lot of sense and has legs for Community Broadband. But what will be the temperature for participation and risk inside conservative city governments in a downturned economy? How much money does any city have access to when in a budget cutting mode? Taking the bold steps to undergo a Digital Transition, especially in a downturn, boils down to a series of political decisions made after all the business variables have been laid out, which leads us to the third axis.

Politics: This topic is a true wild card. Wherever there are human beings and competing interests, politics will be present to complicate matters. In local government, politics reach out and touch everyone, in city departments, on the dais of the City Council and in the backrooms, the stakeholders in the community, on the front pages of the local paper, etc. Does your community have a strong leader pushing your city government into adopting 21st century business practices? Or are you faced with a set of competing barons and political fiefdoms that add to the complex environment by preserving existing local power structures? Whatever the local situation, political issues and risks must be addressed, ideally through anticipation, inclusiveness, scenario planning, and political strategy.

A final note to readers

This book is written as a primer for civic leaders who have *little to no knowledge of community broadband* and its many facets. Why would they? But all leaders must gain that knowledge if they are to recognize alternative paths for local economic development and to realize the potential inherent in their communities. So in advance, let me apologize for not going deeper on the many, many topics that make up the subject of community broadband. Had I gone deeper, indeed, I would have written a very long book, and I have little doubt that fewer people would have read it. What would be the point of that?

I hope the format and length of each chapter make the book more readable and that readers will be encouraged to share the book, better yet, to urge their friends and colleagues to buy a copy for themselves and share it. We desperately need a national dialogue on these issues.

My goal was to write a book that was highly accessible. I want it to be read easily in the course of a medium-long airplane ride, say, from Austin to Atlanta, or in successive readings while killing time, waiting for a cab, waiting at the doctor's office, etc. In other words, the many chapters in this book are mostly pretty short and can be read quickly, so this book should be easy to pick up and put down, without worrying about losing one's place. This book is designed for busy people without much time.

The chapters are laid out in alphabetical order, making this book somewhat like the internet, in that each subject is available for access in random order, and the chapters need not be read in any order at all. Links in the book are intended for a follow-on electronic version.

Traditionalists will want to read this book from cover to cover, out of habit. But I urge readers to browse the Table of Contents and to read chapters they find appealing, and then check them off after reading them. That's what the boxes in the TOC are there for.

I've recognized that Community Broadband is very complex topic to grasp and that those who hold the keys to getting things going, the civic leaders in communities across America, lack a clear understanding of the new tools that technology has recently made available. This book is offered to stimulate informed dialogue about the Digital Transition we all must go through to move America forward. We need this new infrastructure and these new applications and devices and the progress they will bring. It's time to get moving! Be sure to visit www.metronetiq.com and stay in touch!

A handwritten signature in black ink, appearing to read 'John Cooper', with a stylized flourish at the end.

John Cooper
President, MetroNetIQ
July 15, 2008

A

Applications: Wireless Broadband Goes To Work

Cars and Trucks

If a broadband network is like a highway, then the applications that run on the network are like the cars and trucks that drive on that highway. While most people think of the Triple Play when it comes to broadband (i.e., internet access, voice, and video), the number and variety of applications that can be used on a wireless broadband network is limited only by the imagination of the marketplace and the ability of companies to meet the perceived need as awareness of the versatility of a broadband-based platform grows.

Driving the growth of broadband applications are two principal factors: 1) the need for broadband users to find efficiencies and cut costs; and 2) the declining costs of Wi Fi client chips and other digital technologies - as the price drops with growing production volumes, it makes economic sense to make more electronic devices “Wi Fi compatible” by adding Wi Fi capability and digital technologies like storage make more sense.

The benefits of a Wi Fi Mesh network do not stop with a Wi Fi laptop that extends office functionality beyond the traditional fixed connection boundaries of a corporate network (or the cable and telecom ISP), although such *mobile data access* is a huge improvement and a vital component of the value equation.

In the end, Wi Fi technology offers more versatility and utility to mobile devices of all kinds and enables applications that did not make sense without the ubiquitous network that a Wi Fi Mesh solution brings.

Broadband applications may often require specialized equipment, or conversely, the applications may work on general purpose equipment such as a laptop or PDA.

Broadband applications are discussed in this brief from two perspectives: Public Sector Applications and Private Sector Applications.

Stakeholder	Applications & Benefits
Local Governments	<ul style="list-style-type: none"> ➤ Public Safety – video surveillance = lower crime rates ➤ Infrastructure Mgmt – utilities, sensors, AMI, field data ➤ Field Data (Public Safety & other departments) – mobile applications = more time spent out in the field being productive ➤ Economic Development – affordable, ubiquitous broadband = lower cost of doing business, increased options re marketing, sales
State & Federal Governments	<ul style="list-style-type: none"> ➤ Disaster Management & Recovery – common communications net ➤ Border Security – affordable high tech monitoring options ➤ Economic Development – affordable, ubiquitous broadband = lower cost o doing business, increased options re marketing, sales
Businesses	<ul style="list-style-type: none"> ➤ ecommerce websites – reach world markets for local goods ➤ Web 2.0 applications – cheap and easy for startups ➤ Location-based services – new options for marketing and sales
Communities	<ul style="list-style-type: none"> ➤ Neighborhood chat – Instant Messaging improves communication ➤ Neighborhood eWatch – video surveillance of buildings & homes ➤ Local video coverage – local media for local events
Individuals	<ul style="list-style-type: none"> ➤ Affordable, Ubiquitous Broadband Access enables consumer applications and enhanced lifestyles: <ul style="list-style-type: none"> ○ Voice over IP ○ Music ○ Video ○ Gaming ○ Social Networking

A general purpose communications network enables a variety of digital applications

Public Sector Applications

Public sector application options provide a variety of cost savings that can be used to provide the financial justification to invest in a Wi Fi Mesh network.

Public sector applications fall into two categories: a) *distributed infrastructure*, where wireless broadband supports applications like video security, sensor networks, and automated meters; and b) *field mobile data access* for distributed field employees.

Distributed Infrastructure

From a municipal perspective, a variety of infrastructures can benefit from having access to broadband.

Automated utility meters communicate directly with a network

Automated parking meters that expand revenue opportunities and enhance the user experience

Sensor devices that are constantly monitoring vital status points of a distributed infrastructure and communicating back to infrastructure management centers

- *Highways, Roads, and Streets* will see such wireless broadband applications as traffic light sensors and cameras, passive traffic monitors, traffic monitoring cameras, digital signage, street light controls, and automated parking meter infrastructure.
- *Electric Utilities* will enjoy such wireless broadband applications as video surveillance of high value facilities, SCADA systems, and AMI system backhaul.
- *Water Utilities* will use such wireless broadband applications as video surveillance of high value facilities, SCADA systems and backup data transmission, water and wastewater flow meter data backhaul, pump monitoring, leak detection, and AMI system data backhaul.
- *Gas Utilities* will similarly use such wireless broadband applications as video surveillance of high value facilities, SCADA systems and backup data transmission, gas flow meter data backhaul, leak detection, and AMI system data backhaul.

Field Mobile Data

From a municipal perspective, distributed field employees can benefit from having access to broadband, from using Wireless VOIP instead of cellular while in the field to accessing data applications, from inputting data directly in the field to accessing specialty software applications from the field.

Dual use smart phones use the most efficient network to lower costs

Disaster prevention and response capabilities enhance public safety

Automated license plate readers that can process visual data far more effectively than a patrol officer can

- *Public Safety Workers – Police Officers, Marshalls, Fire, and EMS* – access criminal databases and communicate live with other departments on security risks and emergency situations; more

accurate asset tracking so that routes are minimized and gas costs are reduced

- *Social Service Workers* access client files and update information while in the field
- *Health Inspectors* access account information and input inspection data while in the field
- *Building Inspectors* access account information and input inspection data while in the field
- *Property Appraisers* input video data and update files
- *Animal Health Workers* scan tags, add pictures of animals, update stray animal accounts so that owners can be notified immediately for more rapid processing

Private Sector Applications

Private market / consumer & business application options provide a variety of revenue generation opportunities to help pay for a Wi Fi Mesh network

Dual use smart phones that can choose the most efficient network to lower telecom costs

Digital cameras that can send images directly from the device to the PC

Mobile game devices that can be used to view video sent from a PC or DVR

Location-based services that improve marketing options for retailers

Start with Applications & Business Processes

When considering a digital transition and a metropolitan broadband network, a *quantitative* analysis of current business processes sets a benchmark for improvement. A straightforward business case projection demonstrates savings by challenging assumptions and looking at old ways of doing business from a new perspective, from a *digital* perspective.

Step One: Analysis. Transformation starts with a series of departmental reviews of select business processes and costs. The more thorough this process, the better. All current business processes should be challenged for efficiency, given the potential of new digital tools to complete business tasks more efficiently. Current business costs should be documented and all projected benefits should be included in the analysis, together with any ancillary costs associated with implementing a

solution. In this manner, a projected *net* savings can be calculated and extended over the life of a project.

Step Two: Strategy. Departmental managers should brainstorm first with their staffs, then with each other in order to strategize on how to transform their operations with new digital technology. City managers should encourage their department managers to use best practice benchmarking with other cities that have an acknowledged best practice in one or more areas, with the help of private sector vendors.

Step Three: Focus. Key benefits from a digital transition and deployment of a metropolitan broadband network can be expected to accrue in three distinct areas at first, and then in other areas as familiarity with the new digital capabilities grows.

- a. **Public Safety.** Typically the department with the highest costs, public safety can be transformed to eliminate inefficiency and ultimately, trim labor growth to provide dramatic savings.
- b. **Voice Telecom.** Local and long distance & cellular budgets offer yet more efficiency.
- c. **Field Mobile Data.** All departments with field activity contribute to the cost savings strategy – every dollar counts, so every dollar should be counted.

Step Four: Execution. When a project begins after such planning, it must have tight project management and execution to project milestones.

Step Five: Accountability. As applications are implemented, records should be kept so that benefits can be tracked and compared with preliminary projections. Managers should be held accountable to results with consequences for failure to achieve project objectives.

Applications – Three Key Takeaways

1. Broadband applications are *tools* that we use to accomplish work in the Network Era.
2. To launch a Digital Transition, start with a *quantitative assessment* of current business processes and digital application potential.
3. Broadband is about *more than just the Triple Play*: video, voice, and broadband access – it embraces the public and private potential of harnessing new digital equipment, applications, and networks.