To: Digital Technology Committee
From: Erik Paulson
Date: 12 February 2015
Re: Areas in need of more detail for Wireless Broadband in Madison

Summary/TL;DR: Getting enough spectrum will be the challenge for a wireless broadband network, and we have not had that discussion. Network operating costs may be low, but help desk costs will still be high. Also, long-term we should as a city think about building out an expanded “series of tubes” with more conduit, ala sewer laterals, as the basis for a future Fiber to the Home.

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Since our last DTC meeting, I sat down with two network engineers in the community to review/get another opinion of the 5Nines and RedRover RFI responses. Both of them felt that the proposals were in fact realistic, which was reassuring. They both believed that with the hardware and prices proposed, a working network could be constructed and activated.

The biggest open question I took away from both discussions was that we need to do a better job of understanding the spectrum either the vendor will bring to the table with their proposal, or that the city can obtain and use for this project. Both agreed that spectrum availability was going to drive the number of users the system can support - and the number of potential users will ultimately define the scope of our program. I discussed with one of them how radio station layout affected overall capacity, i.e. could a clever clustering of stations around a tighter area provide better overall bandwidth availability to those residents, rather than a wider coverage area, and his opinion was that it would likely make little difference overall.

We did not discuss how much spectrum we should try to make available and the overall number of simultaneous that could be supported. Spectrum that we know exists today or existed in the past is EBS spectrum currently used by Professor Banerjee and EBS spectrum once held by MATC. It was unclear if 5Nines spectrum is the same as Professor Banerjee or a separate testing license.

Moving forward, this is the crucial discussion to be had: how many users do we want to bring online, and where will we get the spectrum to support those users? Who should own the rights to that spectrum?

On operating costs, the good thing about having few wires is there are few wires that can be damaged by water, construction equipment, squirrels, and the other banes of network operators existence. Therefore, we would expect that the costs to maintain the network should be relatively small. There will also be costs involved in provisioning users on the network and monitoring/billing for their usage, however, most of this will be automated and should be reasonable. The costly item will be at the human “help desk” level, e.g. answering

users questions on “Why can’t I access the Internet.” We will need to be creative in understanding how to provide this.

I suspect that support will best be done in partnership with another entity. MMSD is a possible partner. The Library is another possibility. WiscNet is also an interesting potential partner. While help desk for home users is a bit out of their wheelhouse, they have tremendous connectivity available and a simplified “flat usage” billing.

We had an important side discussion that will matter more at the RFP writing stage: acceptance testing needs to be done in the summer, when the leaves are fully on trees. We should also do randomized testing from various locations, and we should reach out to Milwaukee to understand their experience, where they rejected the pilot WiFi network ( see http://www.jsonline.com/news/milwaukee/29531309.html )

Looking ahead, one of the more interesting parts of the discussion was on expanding the city’s conduit strategy to go beyond conduit for “middle mile” networks, but to start thinking about how to reach individual homes. When streets are ripped up, or new subdivisions are constructed, can we ensure that conduit is placed that could be used as part of a Fiber to the Home network? Could that conduit be managed as an equal-access facility, either as conduit itself, with providers running fiber as needed, or conduit with “dark fiber” pre-installed? The model that we tossed around were sewer laterals: long term pieces of infrastructure that are attached to parcel permanently, connect to existing infrastructure by meeting design standards, and are universally available. The construction costs could be levied on to the existing property and would transfer from owner to owner as the parcel changed hands. The infrastructure should be longed lived and financed as such: it’s likely that much if not every other part will be changed in 10 years, but the basic conduit might last for 20, 40, or even many, many decades beyond that. While there are many instances of city-owned conduit, it is less clear if there are good examples of this sort of access direct to homes. I hope that we could take this up as a discussion at a future meeting.