UC2B Urbana-Champaign Big Broadband

UC2B, Data Centers and Service Providers

The UC2B Policy Board is scheduled to discuss data centers at its next meeting, and to help inform that discussion, I would like to clear up some misconceptions about what support for is built into the UC2B network design. It has been suggested that the current network design does not adequately provide support for "production class data centers".

First of all, the term "production class data center" is not an industry recognized term, but local jargon. Data centers are classed as Tier 1 through 4, or generically Class 0 through 4. Tier classifications identify and are certified to achieve specific levels of availability. The "Tier System" of accountability is copyrighted by the Up Time Institute, which owns and manages all aspects of this classification process. This is costly, and a very scientific approach to managing data center reliability. Telecommunications Industry Association (TIA) 942 specifies the standards for datacenters with respect to classes of tiers.

The Class system of ranking data centers follows a similar format, but is more generic, and non-proprietary. The Class system establishes specific design standards that must be achieved in order to be approved as Class levels 0 through 4. BICSI, a standards organization has published recommendations providing guidance for the design and creation of specifications for redeveloping an existing building space or for new construction of a data center.

Class levels identify the specific requirements needed to grow to the next level of availability. A Class 0 data center might be nothing more than a closet in a business that has a server in it, with no battery backup, no generator, no real physical security, only a single Internet connection, and only one source of AC power. At the other end of the scale, a Class 4 data center must meet a multitude of specific requirements covering all aspects of the data center from location and building construction to backup systems that can reduce downtime to meet 6 nines of reliability.

Building a Class 4 or Tier 4 data center may cost four to six times the cost of building a Tier 1 data center. Tier 4 data centers are certified and must meet every specification level before qualifying for storage of high-risk information including those of the Federal Government, HIPPA, Homeland Security and many financial institutions. A single sub-system failing to meet the requirements for a Tier or Class, will lower that subsystem, and the total facility to the reliability level of that component, in essence, the weakest link.

Tiers 3, 2 and 1 have proportionately less redundancy until you get back to that single server in the closet of your office or under your desk. As you might expect, building and operating a Tier 4 data center is expensive. Many organizations make a risk assessment that takes into account the cost of a data center outage as compared to the cost of building and operating a Tier 4 data center, and opt for something less than Tier 4 for their data.

In Champaign County, there are probably less than a half dozen true Tier 4 data centers. AMDOCS operates two on Fox Drive, but past that I am not aware of any others. The University and Carle

have facilities that probably qualify as Tier 2 or Tier 3. However, by having redundant lower tier data centers in diverse locations you can achieve an expected availability that is similar to what is possible from a Tier 4 data center and many organizations take that route. IT auditors also prefer to have corporate data stored in multiple locations that are not likely to be destroyed by the same natural or man-made disaster.

So what is a "production class data center"? It is simply a facility that supports data center functions. It could be anything from a Tier 1 to a Tier 4 data center.

The only thing UC2B grant can do for any data center that increases its expected availability is to provide dual diverse fiber connections. UC2B cannot do anything about the physical security, the power grid, the battery back-up systems, or the generators that serve any existing or future data center facility. Only fiber, fiber plant construction and network facilities were included in our grant applications. Any other construction related to data centers is out of scope.

Let's examine what the current UC2B network design does for existing and possible future data centers operated by the cities of Urbana and Champaign, Champaign County as well as the University and some private organizations.

Urbana

Today, the City of Urbana has servers in the basement of the Urbana City Building on Vine Street. There is an existing single fiber entrance into that building. UC2B will build a second diverse entrance into that building. As a result, Urbana can have diverse fiber connectivity to the UC2B network core, to ICN and to other providers such as AT&T and Paetec/McLeodUSA in Node 2 if it so chooses. Mission accomplished for the existing Urbana City Building facility.

Urbana is considering utilizing a planned data center in the ILEAS building in east Urbana at some point in the future. There is one existing fiber entrance into that facility today. UC2B will build a second diverse fiber entrance into that building. The city of Urbana, Champaign County or any other entity that houses storage of servers in the future ILEAS data center can have diverse fiber connectivity to the UC2B network core, to ICN and to other providers such as AT&T and Paetec/McLeodUSA in Node 2 if it so chooses. Mission accomplished for the future ILEAS facility.

Champaign

The City of Champaign today has servers on the third floor of the Champaign City Building. UC2B will have dual, diverse fiber connectivity into the City Building. As a result, Champaign can have diverse fiber connectivity to the UC2B network core, to ICN and to other providers such as AT&T and Paetec/McLeodUSA in Node 2 if it so chooses. Mission accomplished for the existing Champaign City Building facility.

Champaign has some redundant servers in the Public Works building, and has tentatively identified that building as a site for an expanded back-up data center for the City. UC2B will build dual, diverse fiber entrances into the Champaign Public Works building. From the Public Works Building, Champaign can have diverse fiber connectivity to the UC2B network core, to ICN and to other providers such as AT&T and Paetec/McLeodUSA in Node 2 if it so chooses. Mission accomplished for the Public Works facility.

Champaign is also considering using some space in the Parking Garage as a future data center. There already exists a single fiber entrance to that facility. If Champaign moves forward with using that space as a data center, there will be UC2B fiber available to support a second diverse entrance. As with the other two Champaign sites, from this site, Champaign can have diverse fiber

connectivity to the UC2B network core, to ICN and to other providers such as AT&T and Paetec/McLeodUSA in Node 2 if it so chooses. Mission easily accomplished for the Parking Garage facility.

Champaign County

The METCAD and Emergency Services building on East Main Street in Urbana has a single fiber entrance today. UC2B will build a dual, diverse fiber entrance in this building. METCAD will have access to dual fiber connectivity to the UC2B network core, and to other public safety facilities and first responders that are served by UC2B fiber. METCAD will also be able to have dual, diverse fiber connectivity to AT&T in Node 2, which if configured correctly can prevent a future loss of E911 services like what we saw recently when AT&T's copper cable was cut. Mission accomplished for METCAD.

Champaign County actually owns the ILEAS facility and as indicated above, it will be well served by UC2B fiber.

The basement of Champaign Fire Station #6 on Windsor Road by Duncan has been designated as the future Emergency Services back-up site for Champaign County. In the event that the current Emergency Services / METCAD building becomes unusable, Emergency Services and METCAD operations and personnel would in theory move to the basement of this fire station. UC2B will be constructing dual, diverse fiber entrances into Fire Station #6. From this site, Emergency Services and E911 systems can have diverse fiber connectivity to the UC2B network core, and to AT&T in Node 2. Mission accomplished for this location.

The University

The University is working towards consolidating many of its campus data center functions in the Advanced Computation Building on Springfield Avenue once NCSA moves out. That building currently has a single fiber entrance. UC2B fiber cables and a strategically placed manhole will make a second diverse fiber entrance possible. Mission accomplished for this location.

Private Data Centers

While the purposes of the NTIA and DCEO grants do not include providing connectivity to privately owned data centers, the locations of UC2B fiber cables will facilitate expanded connectivity options for several existing data center facilities.

There will be a UC2B lateral fiber cable in the front yard of the two AMDOCS Tier 4 data centers on Fox Drive. They already have both AT&T fiber as well as Paetec/McLeodUSA fiber. UC2B will become a third fiber option. We will have gone as far as the grant will allow in providing fiber connectivity for AMDOCS.

There is a small data center in the former Motorola Building on the southwest corner of First Street and St Mary's Road at the north edge of the first phase of the Research Park. That building is now called the Gateway Building, and it is served by a single University fiber cable and a single Comcast coaxial cable. There will be UC2B fiber on Oak Street immediately behind that building. Should the owners of the Gateway building desire UC2B fiber to serve the data center in the Gateway building, it will be very easy to construct that last 200 feet. We will have gone as far as the grant will allow in providing fiber connectivity for the Gateway building.

Justin Hill's company - Prominic - operates a data center in one of the buildings immediately to the west of the Illinois Central tracks and south of Springfield Avenue (behind Fannie May Candies.) Volo Broadband has already built fiber into this facility from its east-west fiber cable on Springfield Avenue. Volo's fiber cable will cross UC2B's north-south fiber cables at 3rd Street and Springfield Avenue (and several other places.) Should Volo, Prominic or some other tenant of that data center desire UC2B network connectivity, it will be easy to achieve by splicing Volo strands to UC2B strands at 3rd and Springfield (or at the other places where UC2B and Volo fiber cables cross.)

There will also be UC2B fiber at Pro Ambulance, just to the southwest of the Prominic facility. If dual, diverse connections to the UC2B network are desired from the Prominic data center, extra strands on the Pro Ambulance lateral cable could be used for that purpose.

The Carle organization operates a data center on University Avenue in east Urbana, next door and to the southwest of the MTD offices. Should Carle desire one or two UC2B fiber connections to their facility, we will be able to provide them from the fiber cable that is serving MTD.

John Dimit from the Champaign County Economic Development Corporation (EDC) has said several times that there have been companies interested in building data centers in northwest Champaign, but have been deterred by the lack of ringed fiber in that area. Once the seven UC2B rings are complete, northwest Champaign and other potential data center locations throughout the entire rest of the community will have ringed UC2B fiber available - typically less than a half-mile away. Companies seeking to locate data centers in our community will have many locations to choose from, and the lack of ringed fiber availability will no longer keep them from investing here.

The strength of the UC2B ring design and central network core is that a data center can be located almost anywhere in the community and can be served by dual, diverse fiber connections. Those diverse connections can go to the UC2B network core, to regional Internet providers such as AT&T, and Paetec/McLeodUSA, to any other location in the community, or to any combination of those options. There are roughly 500 possible points of ringed connection to the UC2B network spread across the community. These 500 locations greatly reduce the costs for those who chose to connect or enhance the connections of current or future data centers.

Service Providers

In the same way that the seven UC2B fiber rings allow data centers can be located anywhere, service providers can also be located anywhere in the UC2B service area. With a fairly minimal one-time expense, any existing service provider can be dually connected to the UC2B network core and provide services to all UC2B subscribers. Service providers can maintain physical control of their own equipment in their own facilities while still being able to provide services over the UC2B network. The UC2B network design reduces the need for large centralized "carrier hotels" or co-location spaces.

Conclusion

As the UC2B fiber design stands today, it is very data center friendly and very service provider friendly. The current and future data center connectivity needs of the UC2B consortium's founding members are specifically addressed. There are clear and inexpensive paths for private organizations to connect to UC2B fiber at their own expense.

Mike