

Champaign County Big Broadband

Our Broadband Future

Champaign County Board

Study Session

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June 29, 2021



Introduction

- Have been around Champaign County since 1968
- In the mid '70s - worked for University Extension
- In the '80s - taught at EIU and the U of I
- In the mid '90s - Started ServerCom - an early ISP
- 1997 - Wrote the C-Unet2000 fiber proposal
- 1999 - Managed U of I fiber project for McLeodUSA
- 2009 - Created UC2B - awarded \$26 million in grants
- 2021 - Still working on new UC2B grant proposals
- Tonight - I am representing myself, not UC2B or UIUC



1997 C-Unet2000

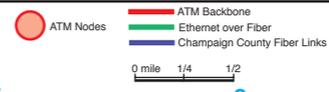
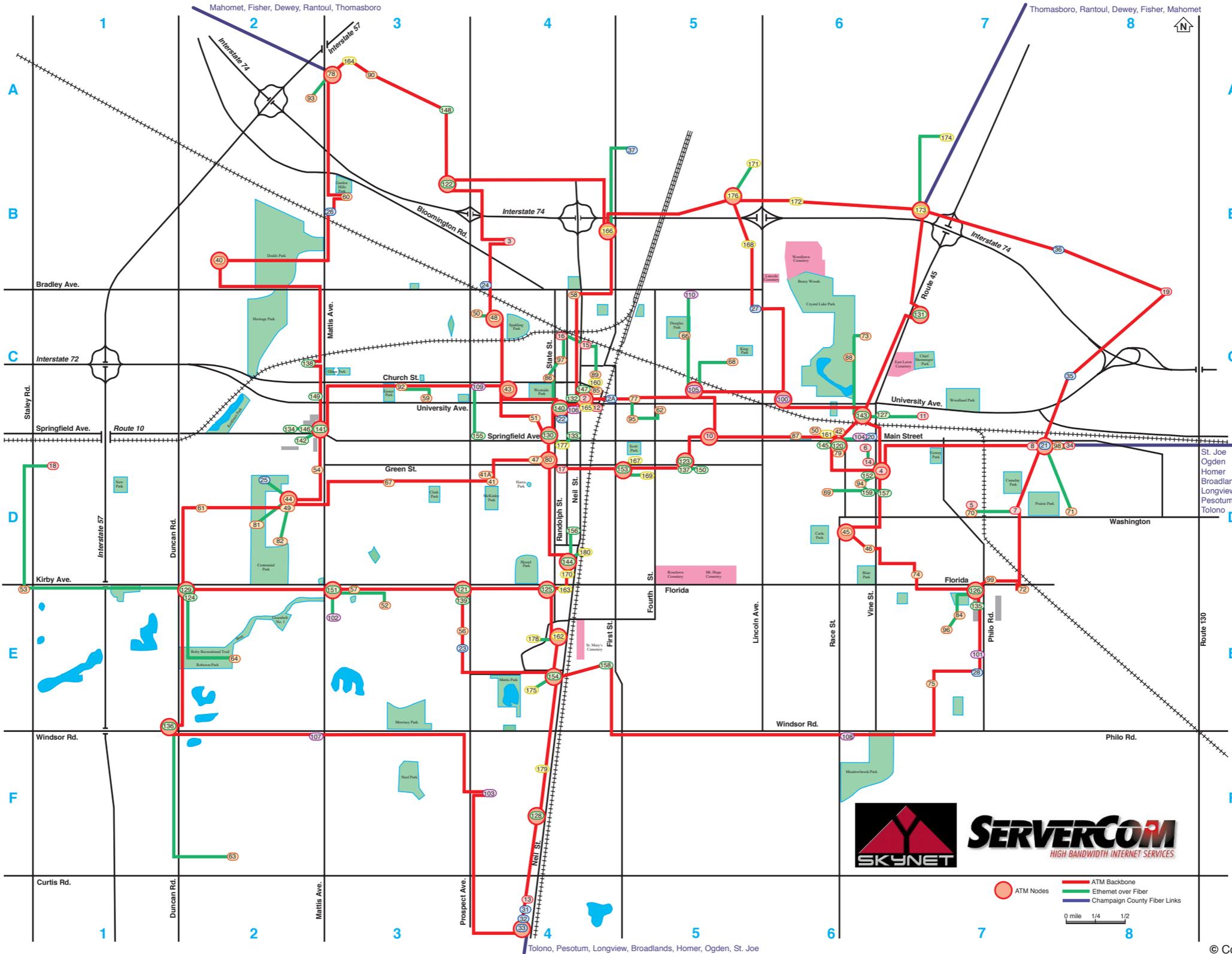
C-Unet2000 - 10/20/97 Draft of ATM Backbone and Network Node Locations

Public Sites

- govnet**
 - 2 City of Champaign - C4
 - 3 Champaign Public Works - B4
 - 4 City of Urbana - D6
 - 5 City of Urbana PW - D7
 - 6 County Courthouse - D6
 - 7 Champaign County Offices - D7
 - 8 Regional Planning - C6
 - 10 University of Illinois - C5
 - 11 MTD - Main Offices - C7
 - 12 MTD - Intermodal Center - C4
 - 13 Savoy Government - F4
 - 14 Federal Courthouse - D6
 - 15 C-U Public Health - C4
 - 16 C-U Public Health - C4
 - 17 Champaign Township - D4
 - 18 Champaign Township - D1
 - 19 Urbana Township - C8
- copnet**
 - 2A Champaign Police - C4
 - 4 Urbana Police - D6
 - 20 Champaign County Sheriff - C6
 - 20 Champaign County Jail - C6
 - 10 University of IL Police - C5
 - 21 METCAD - D8
 - 22 Champaign Fire Main - C4
 - 23 Champaign Fire - Station 2 - E3
 - 24 Champaign Fire - Station 3 - B4
 - 25 Champaign Fire - Station 4 - D2
 - 26 Champaign Fire - Station 5 - B3
 - 4 Urbana Fire - Main - D6
 - 27 Urbana Fire - N Lincoln - C5
 - 28 Urbana Fire - Philo Road - E7
 - 100 Carle Emergency / Arrow - C6
 - 105 Covenant Emergency / Pro - C5
 - 31 Savoy Police - F4
 - 32 Savoy Fire - F4
 - 33 Willard Airport - F4
 - 34 Youth Detention Center - D8
 - 21 Emergency Services - D8
 - 40 Parkland Police - B2
 - 35 Edge Scott Fire District - C8
 - 36 Carrol Fire District - B8
 - 37 Eastern Prairie Fire District - A5
- edunet**
 - 10 University of Illinois - C5
 - 40 Parkland - B2
 - 41 Champaign Unit 4 Admin - D4
 - 42 Urbana Unit 116 Admin - C6
 - 43 Champaign Central HS - C4
 - 44 Champaign Centennial HS - D2
 - 45 Urbana HS - D6
 - 46 Urbana Middle School - D6
 - 47 Edison Middle School - D4
 - 48 Franklin Middle School - C4
 - 49 Jefferson Middle School - D2
 - 50 Judah Christian - C4
 - 51 Holy Cross Grade/Middle - C4
 - 52 St. Mathew's Grade/Middle - E3
 - 53 Country Side School - E1
 - 54 St. Johns Lutheran School - D2
 - 55 Canaan Academy - Urbana - C6
 - 56 Bottenfield - E3
 - 57 Carrie Busey - E3
 - 58 Columbia - C4
 - 59 Dr. Howard - C3
 - 60 Garden Hills - B3
 - 61 Kenwood - D2
 - 62 Marquette - C5
 - 63 New School - F2
 - 64 Robeson - E2
 - 41A South Side - D4
 - 66 BT Washington - C5
 - 67 Westview - D3
 - 68 King - C5
 - 69 Leal - D6
 - 70 Maintenance/Warehouse - D7
 - 71 Prairie - D7
 - 72 Thomas Paine - E7
 - 73 Washington - C6
 - 74 Wiley - D7
 - 75 Yankee Ridge - E7
 - 10 University High School - C5
 - 77 Don Moyer Boy's Club - C5
 - 78 Lincoln Trail Libraries - A3
 - 79 Urbana Free Library - D6
 - 80 Champaign Public Library - D4
 - 66A Douglas Branch Library - C5
 - 81 CPD - Bresnan Center - D2
 - 82 CPD - Leonard Center - D2
 - 66B CPD - Douglas Center - C5
 - 84 SunnyCrest Manor - E7
 - 85 CPD - Stevick Center - C4
 - 86 CPD - Springer - C4
 - 87 UPD - Springfield - C6
 - 88 UPD - Main - C6
 - 89 Orpheum Science Museum - C4
 - 90 U.S. Army CERL - A3
 - 91 Holy Family School - ??
 - 92 CPD Hays Center - C3
 - 93 New Catholic High School - A2
 - 94 Urbana Senior Residence - D6
 - 95 HACC Skelton Place - C5
 - 96 HACC Steer Place - E7
 - 97 HACC Washington Square - C4
 - 98 County Nursing Home - D8
 - 99 Florida House - E7

Private Sites

- mednet**
 - 100 Carle Main Campus - C6
 - 101 Carle Urbana Branch - E7
 - 102 Carle Champaign Branch - E3
 - 103 Carle Arbors/Windsor - F4
 - 104 Carle Busey Plaza - C6
 - 105 Covenant Hospital - C5
 - 106 Christie Main Clinic - C4
 - 107 Christie Windsor Clinic - F2
 - 10 U of I School of Medicine - C5
 - 108 Clark Lindsay Village - F6
 - 40 Parkland School of Nursing - B2
 - 109 The Pavilion - C4
 - 15 C-U Public Health - C4
 - 16 C-U Public Health - C4
 - 110 Frances Nelson Center - C5
- banknet**
 - 120 Busey Main Bank - D6
 - 104 Busey Plaza - C6
 - 121 Busey Prospect & Kirby - E3
 - 122 Busey - Baytowne - B3
 - 123 Busey Campus Branch - D5
 - 124 Busey County Market - E2
 - 125 Busey E-Bank - E4
 - 126 Busey - Sunnycrest - E7
 - 127 Busey - Schnucks - C7
 - 128 Busey - Savoy - F4
 - 129 CIB Main - E2
 - 130 CIB Springfield - C4
 - 131 CIB Urbana - C7
 - 132 BankIllinois Main - C4
 - 133 BankIllinois Randolph - C4
 - 134 BankIllinois Country Fair - C2
 - 135 BankIllinois Sunnycrest - E7
 - 136 BankIllinois Windsor - E1
 - 137 BankIllinois Campus - D5
 - 138 Bank Illinois County Market C2
 - 139 BankIllinois Prospect - E3
 - 140 Bank One Main - C4
 - 141 Bank One Country Fair - C2
 - 142 Bank One Round Barn - D2
 - 143 Bank One Broadway - C6
 - 144 First Federal Main - D4
 - 145 First Federal Urbana - C6
 - 146 First Federal Country Fair - C2
 - 147 First of America Main - C4
 - 148 First of America Meijer - A3
 - 149 First of America Schnucks - C2
 - 150 First of America Illini Union - D5
 - 151 First of America Old Farm - E3
 - 152 First of America Lincoln Sq. - D6
 - 153 First of America Campus - D5
 - 154 Bank Champaign - E4
 - 155 First Midwest Bank - C4
 - 156 Kankakee Federal Savings - D4
 - 157 Mutual Bank - D6
 - 158 U of I Credit Union - E4
 - 159 Heartland Savings & Loan - D6
- biznet**
 - 160 News-Gazette Main - C4
 - 161 News-Gazette - Urbana - C6
 - 162 ServerCom/Monarch - E4
 - 162 Good Vibes - E4
 - 162 Chamber of Commerce - E4
 - 162 Ramshaw Smith - E4
 - 162 Vosaic - E4
 - 163 AdvanceNet - E4
 - 163 Wolfram - E4
 - 163 Radisson - A3
 - 164 Hobbico - A3
 - 165 Shouting Ground - C4
 - 165 Precision Graphics - C4
 - 166 Human Kinetics - B4
 - 167 Sol Tec - D5
 - 168 Holiday Inn - B5
 - 169 University Inn - D5
 - 170 Chancellor Hotel - D4
 - 171 J.M. Jones - D5
 - 172 PDNT/United CD-ROM - B6
 - 173 American Software - B7
 - 174 Frasca - B7
 - 175 CSC Intellicom - E4
 - 176 Illinois Power - B5
 - 177 Huntington Towers - D4
 - 178 Wordlink - E4
 - 179 AEC Centrec - F4
 - 180 Champaign Telephone - D4



Sites listed in Red are ATM Backbone Nodes.
 Sites listed in Blue are on the Fiber Backbone or are immediately adjacent to it - connected via ethernet.
 Sites listed in Black are connected via ethernet over fiber to a backbone node.



Five Suggestions

1. Build “Big Broadband” or go home
2. Hire a Broadband Consultant
3. Create a County-Wide Big Broadband Intergovernmental Consortium
4. Embrace Public Private Partnerships
5. Earmark a healthy percentage of your ARPA funds to facilitate Champaign County Big Broadband projects



Only Build “Big Broadband”

- We have a rare funding opportunity
- We can build infrastructure that will last for generations
- “Broadband” has too many definitions
- Illinois defines “Broadband” as 100 Mbps downstream / 20 Mbps upstream
- I define Big Broadband as starting at 200/50 Mbps and going up from there
- No matter what speeds you build today, they will seem shortsighted in 10 years



Hire a Broadband Consultant

The First Consulting Engagement

- Create a Broadband Plan for all of Champaign County
- This process was started last week

The Second Consulting Engagement

- First, the County Broadband Plan needs to be adopted by the County Board
- Assist the County in applying for Broadband Infrastructure Grants
 - Illinois - DCEO and Feds - NTIA?



Intergovernmental Consortium

- Champaign County
- Every Municipality in the County
- The University of Illinois
- Parkland College
- The Regional Office of Education
- Every County School District



Embrace Private Partnerships

- Champaign County can own the infrastructure
- Private companies will lease that infrastructure
- Private companies provide services using that infrastructure
- Private companies will maintain the County's infrastructure



Earmark & Leverage ARPA 3:1

- Earmark up to \$ZZ million of County's ARPA funds for Big Broadband Projects
- Seek up to 2 x \$ZZ million from DCEO Broadband Infrastructure Grants
- Get up to \$ZZ million from Private Partners' Infrastructure leases
- The final total costs will depend on the technologies deployed and the areas served
- You are not too late to this discussion
- Nobody else has approved anything yet



3 “Big Broadband” projects

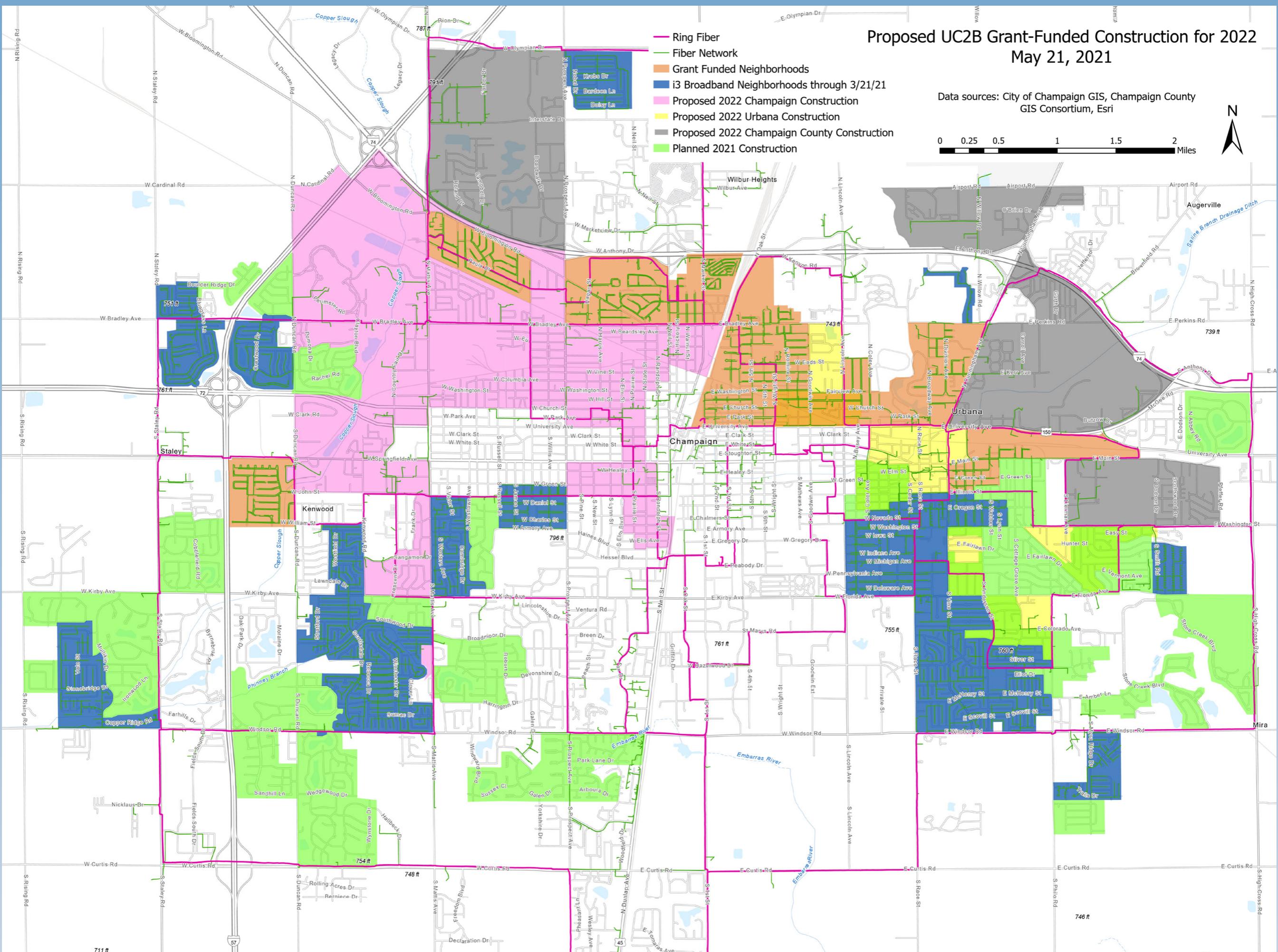
- 1. Unincorporated areas of Urbana & Champaign**
 - Partnerships with DCEO, UC2B, i3 & the Cities
- 2. Housing Authority Wi-Fi service**
 - Ubiquitous coverage of all Housing Authority complexes in Champaign County
 - Partnerships with DCEO, HACC, UC2B, i3 Broadband and the University of Illinois
- 3. Serve the “Underserved” in Champaign County**
 - “Robust” and “Affordable” broadband for every home and business in Champaign County
 - Partnerships with DCEO, the Farm Bureau, UC2B, i3 Broadband & other Internet Service Providers

Proposed UC2B Grant-Funded Construction for 2022

May 21, 2021

Data sources: City of Champaign GIS, Champaign County GIS Consortium, Esri

- Ring Fiber
- Fiber Network
- Grant Funded Neighborhoods
- i3 Broadband Neighborhoods through 3/21/21
- Proposed 2022 Champaign Construction
- Proposed 2022 Urbana Construction
- Proposed 2022 Champaign County Construction
- Planned 2021 Construction



711 ft

746 ft

Rush Branch



Proposed Mixed Areas

- Collectively have higher than average local rates of poverty based on 2010 Census
- The mixed County/Municipal Census Block Groups are:
 - Urbana: 54.01-1, 54.01-4, 54.01-5, 54-02-1, 55-3
 - Champaign: 8-1
- Verification and Possible Modification by
 - Discussions with the Cities' and County's staff,
 - The School Districts' school lunch program data
 - Section 8 housing data
 - Loaner Wi-Fi Hotspot location data



UC2B Mixed Areas Costs

- Total Estimated Cost: \$1.8 million
- State DCEO Grant: \$900,000
- i3 Broadband Fiber IRU: \$450,000
- Champaign County ARPA: \$225,000
- City of Urbana ARPA: \$187,500
- City of Champaign ARPA: \$37,500



Housing Authority Wi-Fi

- 10 Housing Authority complexes in C-U with existing UC2B fiber at the curb
- The “new” Thornberry complex in Champaign needs a half-mile fiber build to connect to UC2B
- Connectivity solutions are needed for Mahomet and Rantoul
- A common authentication system
 - Unique login credentials for each resident
 - They work throughout every HACCC location



Housing Authority Wi-Fi Costs

- Total Estimated Project: \$1 million
- State DCEO Grant: \$500,000
- Champaign County ARPA: \$500,000
- Partnership with DCEO, HACCC, UC2B, i3 Broadband, the University of Illinois and possibly other private service providers



The Big Project

What Needs to be Done?

Champaign County needs to facilitate “robust” and “affordable” Big Broadband for every home and business in Champaign County.



Why should you do this?

Learning from Lafayette, Louisiana

- **1896 - The City wanted electricity service**
 - The Power Companies said wait for 20 years
 - City built its own power system & it still operates it
- **2005 - The City wanted Big Broadband**
 - City pleaded with telephone & cable companies
 - They were told to wait, or that they did not need it
 - Voters passed a referendum to build their own fiber-based Internet system.
 - It is still working as planned



Lafayette Mayor Durel



Mayor Durel believed that Big Broadband would enable opportunities for his children & grandchildren to be educated, to stay in Lafayette as adults and to raise their families and have fulfilling careers without having to move away. I think we all want that for our Champaign County families.

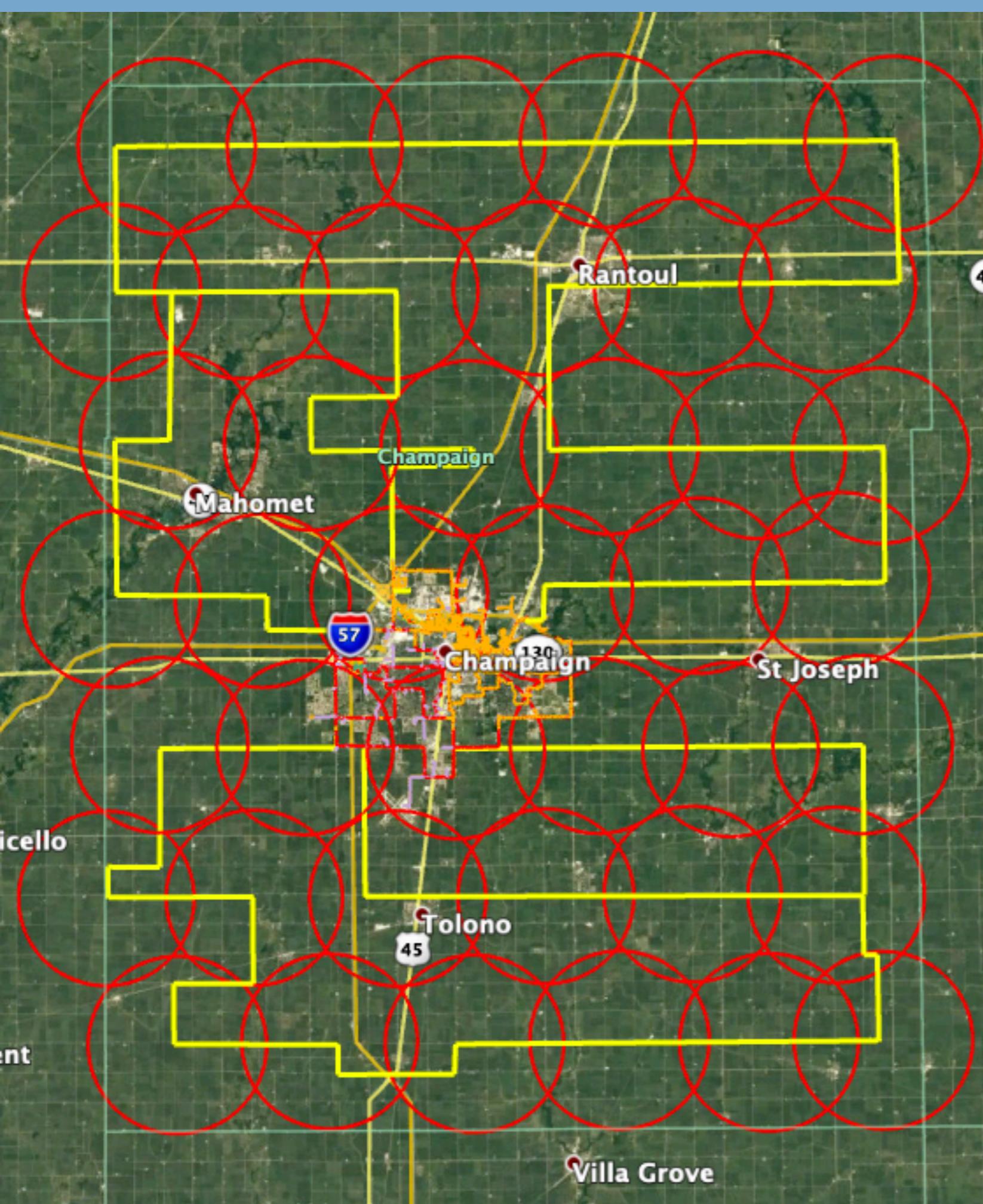
Big Broadband Planning

CC2B Quadrants

- Minimize expensive railroad & Interstate crossings
- Leverage existing UC2B connections to the Internet
- Allows breaking a large project into smaller pieces for funding

Hybrid Wireless & Fiber

- 42 Towers
 - 60-80? Feet Tall
 - 3-mile service radius
- 260 miles of ringed buried fiber cable to connect towers
- Wireless type & technology to be determined





2 Types of Wireless

Many Technologies - Two Types of Wireless

1. Fixed Wireless

- Typically a Directional Antenna at user's location
- Mounted to the roof or high on the side of a structure facing the tower
- Allows for greater bandwidth at greater distances

2. Mobile Wireless

- Your cellular phone is the best example
- Portable and has an omni-directional antenna
- 5G and 6G cell services have limited range
 - But they support greater bandwidth older cellular technologies



Hybrid Wireless/Fiber Costs

- Total Estimated Cost: up to \$30 million
 - 260 Miles of ringed Fiber
 - 42 60-80' Towers with 140 Transmitters & Antennas
 - Fiber and Wireless design & installation
 - Core Electronics
- DCEO Grants - up to \$15 million
- Champaign County - up to \$11 million
- IRU pre-payments - up to \$4 million
 - Less than 25% due to increased operational costs with wireless and not as much useful fiber to lease



Hybrid Wireless Advantages

- Total Cost is less than half of all fiber
 - County's investment would be 37% of total
- Support for Mobility
 - Farmers and students are always on the go
- Ease & speed of adding new customers
- Direct support for precision agriculture
- Less disruption of drainage tiles
- Affordable service for low-income families
 - In both rural and incorporated areas
- Leverages our County's flat terrain

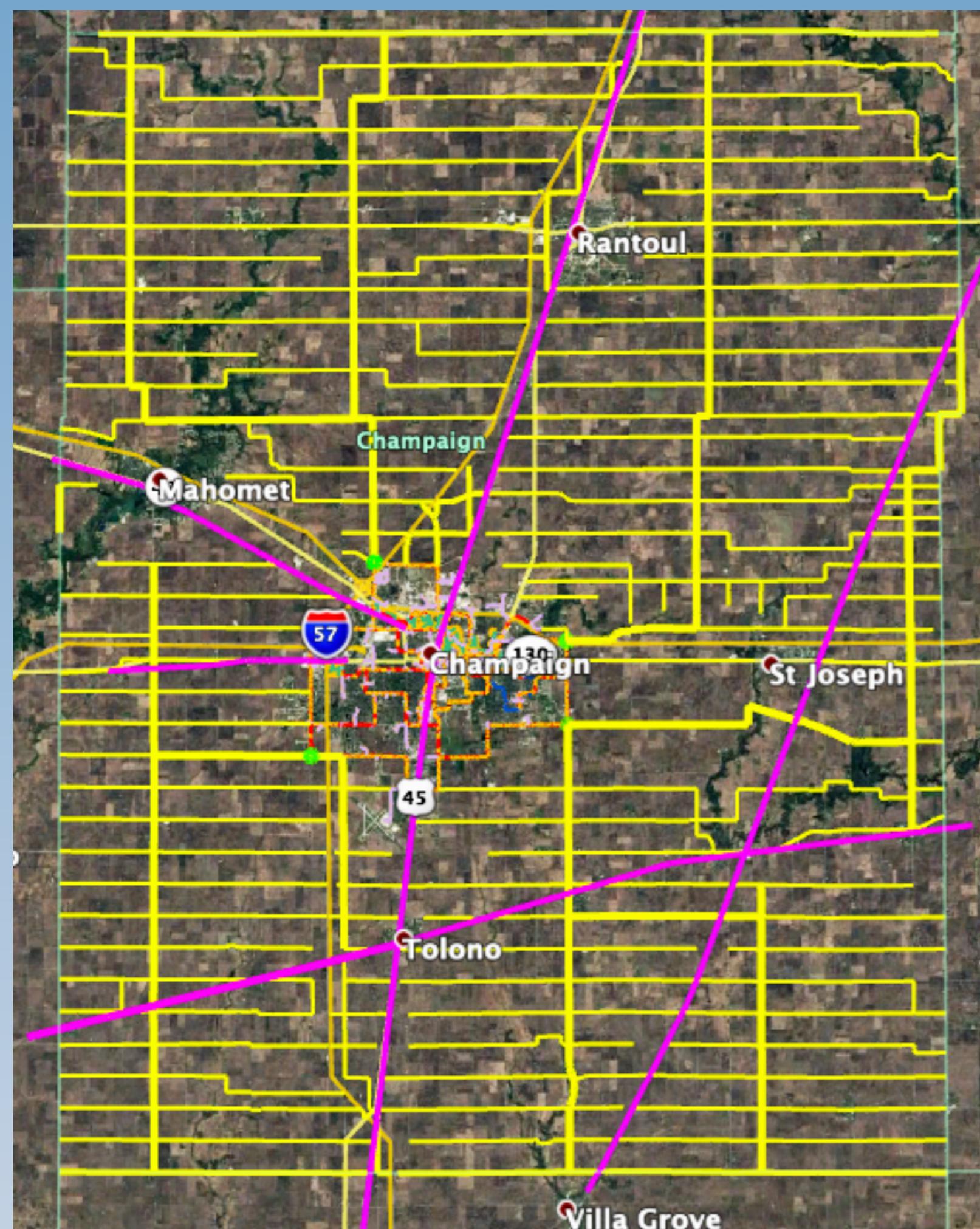


Hybrid Wireless Disadvantages

- Wireless technology will change
 - 140 transmitter upgrades - 60-80 feet in the air
 - Thousands of upgrades on the roofs of buildings
- Weather can create problems
 - Can impact service performance or reliability
 - Can damage equipment on towers & buildings
- Potentially creates two classes of users
 - “Have Fiber” and “Do Not Have Fiber”
- Do you want 42 new 60-80 foot towers?
- Ask Volo and Pavlov about their moves to Fiber and away from Wireless

Fiber-to-the-“Curb”

- All main East-West County Roads
- Additional fiber as needed for North-South Roads
- 1,462 total miles of linear buried fiber to pass 88% of all rural homes & businesses
- 4 Huts/Cabinets near C-U for core electronics
- Nothing powered or above ground past the C-U Huts/Cabinets





Fiber-to-the-“mailbox”

- Total Estimated Cost: up to \$80 million
 - 1,452 Miles of linear Fiber
 - Fiber design & installation
 - Four cabinets on UC2B rings to feed the system
 - Fiber-to-the-mailbox at 88% of the unincorporated homes and businesses
 - Internet connections for non-C-U HACCC sites
 - Internet connections for unserved municipalities
- DCEO Grants - up to \$40 million
- Champaign County - up to \$20 million
- IRU pre-payments - up to \$20 million



Buried Fiber Advantages

- The most “robust” option available
 - Supports infinite bandwidth
 - Provides the most reliable service
- Easy upgrades for core & customer
 - Plug and Play Equipment
- Buried fiber is safe from Weather issues
- Central locations for the core electronics
 - Just 4 core chassis on the ground
 - Instead of 140 transmitters 60’ - 80’ in the air
- Equality of service options for everyone
- Fiber infrastructure lasts for decades



Buried Fiber Disadvantages

- **Cost, Cost & Cost**
 - This would use half of your ARPA funds
 - There are other worthy proposed uses for that money
 - This could give DCEO heartburn and worse
- **Installation Issues**
 - Drainage tile is not tracked by J.U.L.I.E.
 - Farmers will need to work closely with the fiber installation crews to protect their drainage tile
 - Some will be damaged
- **Post Installation Issues**
 - Farmers will need to contact J.U.L.I.E.
 - Before they do any digging near County roads



My Personal Recommendations

1. Build the most robust hybrid wireless system you can afford
 - Connect the wireless towers with buried ringed fiber
2. Use the fiber rings to also connect unserved and underserved municipalities
3. Cover the entire County
 - If you cannot justify the cost to cover the entire County now, when you may only have to pay 25% of the total cost, how will you ever justify doing it when may you have to pay 100% of the cost?
4. Listen to your Consultant



Questions

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