Office of the Chief Information Officer
KIM REYNOLDS, GOVERNOR
ADAM GREGG, LT. GOVERNOR
STATE OF IOWA
MATT BEHRENS, INTERIM DIRECTOR &
CHIEF INFORMATION OFFICER

Exhibit I – NOFA #007 ("NOFA")
Instructions for Submitting a Wireless Project Design Worksheet

Wireless projects must demonstrate infrastructure deployed as a function of the Project contains adequate backhaul capabilities to Facilitate Covered Speeds to the entire coverage area listed in Exhibit B. Accordingly, the Office is requesting additional information from Applicant's proposing wireless projects to confirm these capabilities.

Wireless Applicant's must include the following information. Attach the requested information to a signed copy of this Worksheet and upload as a single PDF file to the Iowa Grants System consistent with the Instructions set forth in NOFA #007 section 2.2.6.9. **NOTE: Applicants proposing wireline Projects are NOT required to complete this Exhibit.**

1. **Select the Technology for Last Mile Deployment;**
   - 1.1. Identify the Model of antennas (tower and users) - point to point or point to multi-point
     - 1.1.1. What is the range and capacity of the antennas? (miles and bandwidth)
     - 1.1.2. What are the power levels used? (decimal loss)
     - 1.1.3. What are the antenna heights used to facilitate services to subscribers?
   - 1.2. Specify the coverage calculation method used
     - 1.2.1. Tower Radius (specify units for height and distance)
     - 1.2.2. Propagation Map (The tower locations need to be labeled consistent with 4.1)
     - 1.2.3. Combination of materials that demonstrate project's propagation area
2. **Identify Tower Antenna Configurations and Capacities**
   - 2.1. Omni (User count at facilitated speed specified in application and distance away from the tower) **or;**
   - 2.2. Each Directional Sector (User count at facilitated speed specified in application and distance away from the tower)
   - 2.3. Stacking Ability in Frequency Range (functional increase percentage per sector)
3. **Map of Tower Locations**
   - 3.1. Specify the locations of the towers on a map with identifier
4. **Tower Data Set (excel chart)**
   - 4.1. What is the Tower Identifier?
   - 4.2. Location as latitude and longitude
   - 4.3. Tower Type
     - 4.3.1. Erected for Project
     - 4.3.2. Leased for Project
   - 4.4. Tower Height
   - 4.5. Sector Count
   - 4.6. Number of Stacked Frequencies used
   - 4.7. Potential service feeds based on blocks covered
5. **Backhaul Map**
   - 5.1. Specify connections among tower and to drain locations (latitude and longitude)
   - 5.2. Indicate backhaul direction
   - 5.3. Use lines for wireless, use routes for fiber

6. Backhaul Data Per Tower

6.1. Max backhaul capacity required based on homes and businesses served
6.2. Backhaul aggregations
6.3. Backhaul destinations
6.4. Backhaul type
6.5. Backhaul Capacity
6.6. Oversubscription Rate

7. Drain Data

7.1. Indicate drain
7.2. Indicate drain oversubscription value

8. Locational Contingencies

8.1. Describe your approach to resolving issues such as:
8.1.1. Selected build location unavailable
8.1.2. Tower site intended for lease has no capacity
8.1.3. Geographic disparity during detailed design

9. Certification of Compliance. I certify on behalf of the Applicant that I will comply with the terms, conditions, and requirements of Iowa Code section 8B.11, Iowa Admin. Code ch. 129—22, and this NOFA.

In addition to any criminal penalties authorized by Iowa Code section 720.2 that may result from any false statements of material fact made herein or any other remedies available at law, equity, or otherwise, an Applicant that is subsequently determined to have made a statement, representation, warranty, certification, or attestation in an Application, or any attachments or enclosures associated therewith, that is later proven untrue in any material respect shall be obligated to repay the Office the entire amount of any grant funds previously distributed by the Office to the Applicant.

Sincerely,

Michael D. Schill
Authorized Representative's Signature

11-22-21
Date

Michael J Schill
Name (Printed)

President
Title

Natel, Inc.
Entity

436994
NOFA Number

736994 Natel, Inc. - Exhibit I - OCIO Grant Proposal – Wireless Infrastructure Jefferson/Henry County project – Natel responses

1. Last Mile Technology
   1.1. We are proposing a point to multi-point solution with 4 - 90 degree sectors per tower utilizing the 3Ghz CBRS spectrum. This is an breakthrough new technology that has been out for about 1 year that has dealt with all of the traditional wireless drawbacks, especially with unlicensed spectrum, those being Interference mitigation and near and non-line of sight delivery of service. Natel has been delivering wireless in the 2.4ghz and 5ghz bands since the early 2000's. We have gotten quite expert at dealing with these issues but are not able to reach a lot of customers due mainly to trees blocking the link. This new platforms performance has become possible due to the advanced computing power available today. Our vendor has put a solution together that is immune to interference and is able to achieve near and non-line of site connections. They have developed their own silicon for the base and remote nodes along with advanced algorithms to mitigate the interference so that it is null and to be able to re-assemble multipath reflections extremely well to achieve the NLOS capabilities.
      1.1.1. Range and capacity – we are using a 10 mi radius for the range in estimating our coverage. The base sectors/remote node links are capable of up to 650 Mbps download and up to 300Mbps upload speeds. With the overlapping tower areas we are confident on overall coverage of designated census blocks. For any given location we will have 2-3 towers as possibilities to establish solid service.
      1.1.2. On the 3.5Ghz product the power level is 47 dBm. We may use the 5 ghz product in certain areas if warranted and the output of that unit is 36 dBm. We are using the Google Network Planner tool to generate the heat maps to develop the coverage areas we are proposing. They have developed this tool in conjunction with their SAS CBRS service to accurately predict coverage. The vendor provides all the detailed base station and remote node antenna specifications and using the highly accurate Google Earth map data generates the corresponding heat maps.
      1.1.3. The antenna height used to calculate the coverage represented in the Google Network Planner is set at 20-25' at the customer premise.
   1.2. Coverage calculation method used – Google NW Planner (has reputation as the most accurate in the industry)
      1.2.1. We are using a 10 mi radius as recommended by our vendor and by the heat-maps from Google NW Planner. We are delivering service to customers on our existing platform with links that are over 10 miles but

with the coverage overlap of having multiple towers most sites will be in the 3-7 mi range.

1.2.2. See enclosed propagation map images – **Exhibit I – 1.2.2 - propagation maps**

1.2.3. We designed our coverage based up the available vertical assets and then spaced them using 10 mi radius circles of coverage giving plenty of overlap such that any given site could be serviced from multiple tower locations given maximum opportunity for delivering service. Our Google Map images show this clearly. With Google NW planner when you set a pin at the customer location it shows propagation characteristics to each available tower. (see **Exhibit I - 3.1 Map** of tower locations & Example of farm located in a valley-Google NW Planner showing multiple paths)

2. Identify Tower Antenna Configurations and Capacities
   2.1. N/A
   2.2. Each base station sector is a self-contained antenna array that is capable of serving up to 200 subscribers at the 100/100Mbps speeds at up to a 10 Mi radius.
   2.3. Due to the unique interference mitigation capabilities of this technology we will be able to use 1 frequency band across a 4 sector tower. If we were to max out any sector, we will be able to add an additional sector facing the needed direction to facilitate more customers using a neighboring frequency band. In addition, we could add 5 Ghz sectors from the same manufacturer to add capacity.
3. Map of Tower Locations
   3.1. See enclosed **Exhibit I, Section 3.1 map**
4. Tower Data Set – also in attached **Excel chart**
   4.1. We are using a naming convention based upon the location and leased facility name as per attached map
   4.2. We are including map images from Google Earth. See Excel chart
   4.3. Map includes tower type. – **Exhibit I – Section 4 - Excel chart**
   4.4. Excel Chart enclosed
   4.5. Excel Chart
   4.6. Excel Chart
   4.7. Excel Chart
5. Back Haul Map
   5.1. We are including 11 Ghz licensed backhauls to each tower site for immediate turnup while we build out the fiber paths to each tower. Both the wireless and fiber backhaul links connect to our central network operations center that has dual fiber connection to the Internet backbone.
   5.2. Backhaul direction is from tower sites to the NW core then to the Internet backbone via redundant fiber connections.
   5.3. See included map - Exhibit I - 3.1 Map of tower locations
6. Backhaul data per Tower

6.1. Max backhaul capacity required – The 4 proposed towers will be able to serve the 2161 physical locations available in the available census blocks, 335 of them are businesses. Averaged across all the tower sectors each would serve 135 subscribers. The sectors support 1.8Gbps of bandwidth. This results in delivering over 13Mb to each simultaneously. This represents approximate 7x oversubscription. With the fiber feed to each tower will be established at 10Gbps more than covering the maximum capacities of the 4 sectors.
6.2. All backhauls will tie in via fiber to our local network operation center (NOC).
6.3. Destinations are dedicated tower to NOC for each tower feed.
6.4. 10 Gb Single Mode fiber optic based circuit.
6.5. Determined by electronics on each end of the fiber but we will be setting up each backhaul at 10Gbps
6.6. Approximately 7 to 1.

7. Data Drain
7.1. All data will drain to our core network which consists of a fiber ring with 2 connections to the Internet backbone. We have both vendor and physical redundancy to the Internet. These are fiber optic based and can be dialed up to higher speeds within 30 days or so.
7.2. We generally don't calculate it based upon over subscription but on peak usage loads. When we see traffic hitting 60% or higher we order an increase in the capacity of our Internet backbone feeds.

8. Location contingencies
8.1. Resolution of issues
8.1.1. If a site is not available when we go to build we will seek an alternate in the same vicinity. We have capital budgeted to built 140' guyed towers if needed.
8.1.2. We have pre-verified that the tower we want to lease has plenty of capacity but if not we are prepared to build our own tower in the vicinity.
8.1.3. If we run in to and disparities in establishing approved fiber routes there are alternative routes available that we would shift to. If a proposed tower is not available we will lease a different vertical asset or lease the ground in the same area to build our own towers.

436994 - Natel, Inc. NOFA #007 - Jeff/Henry – Wireless Project Design Worksheet

Natel Towers -Jefferson/Henry County Project Area

	4.1 Tower Identifier
B-Street Water Tower	B-Street Water Tower
Birmingham Tower	Birmingham Tower
Triple A Tower	Triple A Tower
Packwood Tower	Packwood Tower
Haysville Tower	Haysville Tower
Richland Tower	Richland Tower
Brighton Tower	Brighton Tower
Lockridge Tower	Lockridge Tower
Olds Tower	Olds Tower
Yarmouth Tower	Yarmouth Tower
Mt Pleasant Tower	Mt Pleasant Tower
Salem Tower	Salem Tower
New London Tower	New London Tower

	4.2 Location Long/Lat
B-Street Water Tower	41° 0'17.81"N, 91°57'41.58"W
Birmingham Tower	40°52'7.67"N, 91°57'3.71"W
Triple A Tower	40°58'33.36"N, 92°10'47.13"W
Packwood Tower	41° 7'52.18"N, 92° 5'2.07"W
Haysville Tower	41°15'48.22"N, 92°14'56.39"W
Richland Tower	41°11'9.62"N, 91°59'33.03"W
Brighton Tower	41°10'31.30"N, 91°49'13.94"W
Lockridge Tower	40°59'34.24"N, 91°44'52.22"W
Olds Tower	41° 8'4.22"N, 91°32'50.45"W
Yarmouth Tower	41° 1'20.28"N, 91°19'20.70"W
Mt Pleasant Tower	40°57'53.54"N, 91°32'25.21"W
Salem Tower	40°51'1.10"N, 91°35'16.44"W
New London Tower	40°53'32.11"N, 91°25'14.49"W

	4.3 Tower Type
B-Street Water Tower	Grain Leg
Birmingham Tower	Communications Tower
Triple A Tower	Communications Tower
Packwood Tower	Communications Tower
Haysville Tower	Grain Leg
Richland Tower	Grain Leg
Brighton Tower	Water Tower
Lockridge Tower	Water Tower
Olds Tower	Grain Leg
Yarmouth Tower	Grain Leg

Mt Pleasant Tower	Communications Tower
Salem Tower	Water Tower
New London Tower	Communications Tower

4.4 Height

B-Street Water Tower	160'
Birmingham Tower	140'
Triple A Tower	175'
Packwood Tower	140'
Haysville Tower	120'
Richland Tower	140'
Brighton Tower	130'
Lockridge Tower	180'
Olds Tower	120'
Yarmouth Tower	140'
Mt Pleasant Tower	150'
Salem Tower	160'
New London Tower	100'

4.5 New Sector Count

B-Street Water Tower	4 - 90's
Birmingham Tower	4 - 90's
Triple A Tower	4 - 90's
Packwood Tower	4 - 90's
Haysville Tower	5 - 90's
Richland Tower	6 - 90's
Brighton Tower	7 - 90's
Lockridge Tower	8 - 90's
Olds Tower	9 - 90's
Yarmouth Tower	10 - 90's
Mt Pleasant Tower	11 - 90's
Salem Tower	12 - 90's
New London Tower	13 - 90's

4.6 Number of Stacked Frequencies

B-Street Water Tower	Single Channel
Birmingham Tower	Single Channel
Triple A Tower	Single Channel
Packwood Tower	Single Channel
Haysville Tower	Single Channel
Richland Tower	Single Channel
Brighton Tower	Single Channel
Lockridge Tower	Single Channel
Olds Tower	Single Channel
Yarmouth Tower	Single Channel
Mt Pleasant Tower	Single Channel
Salem Tower	Single Channel

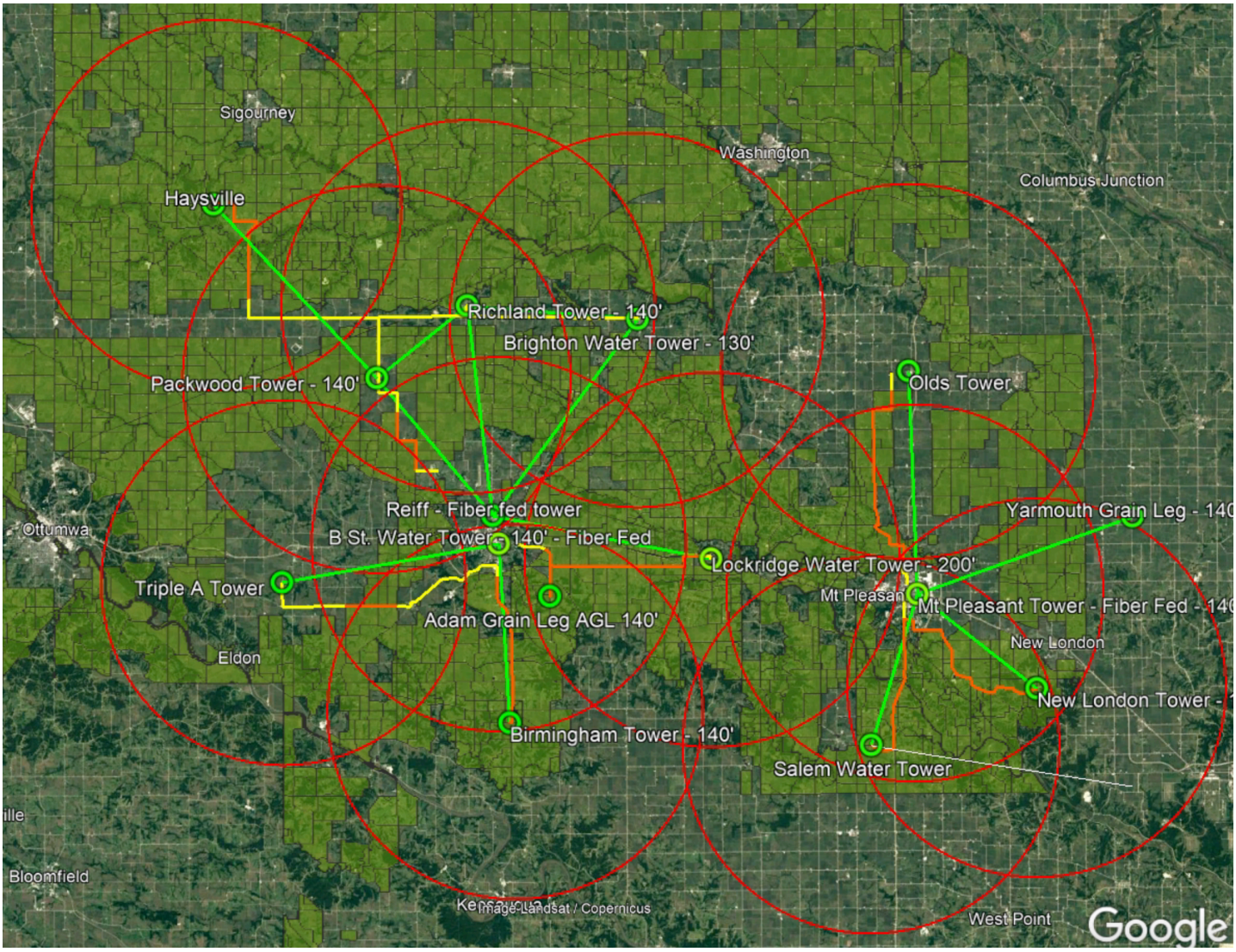
New London Tower	Single Channel

Note: Due to the Interference mitigation technology all 4 sectors can share the same 40 - 80mhz channel

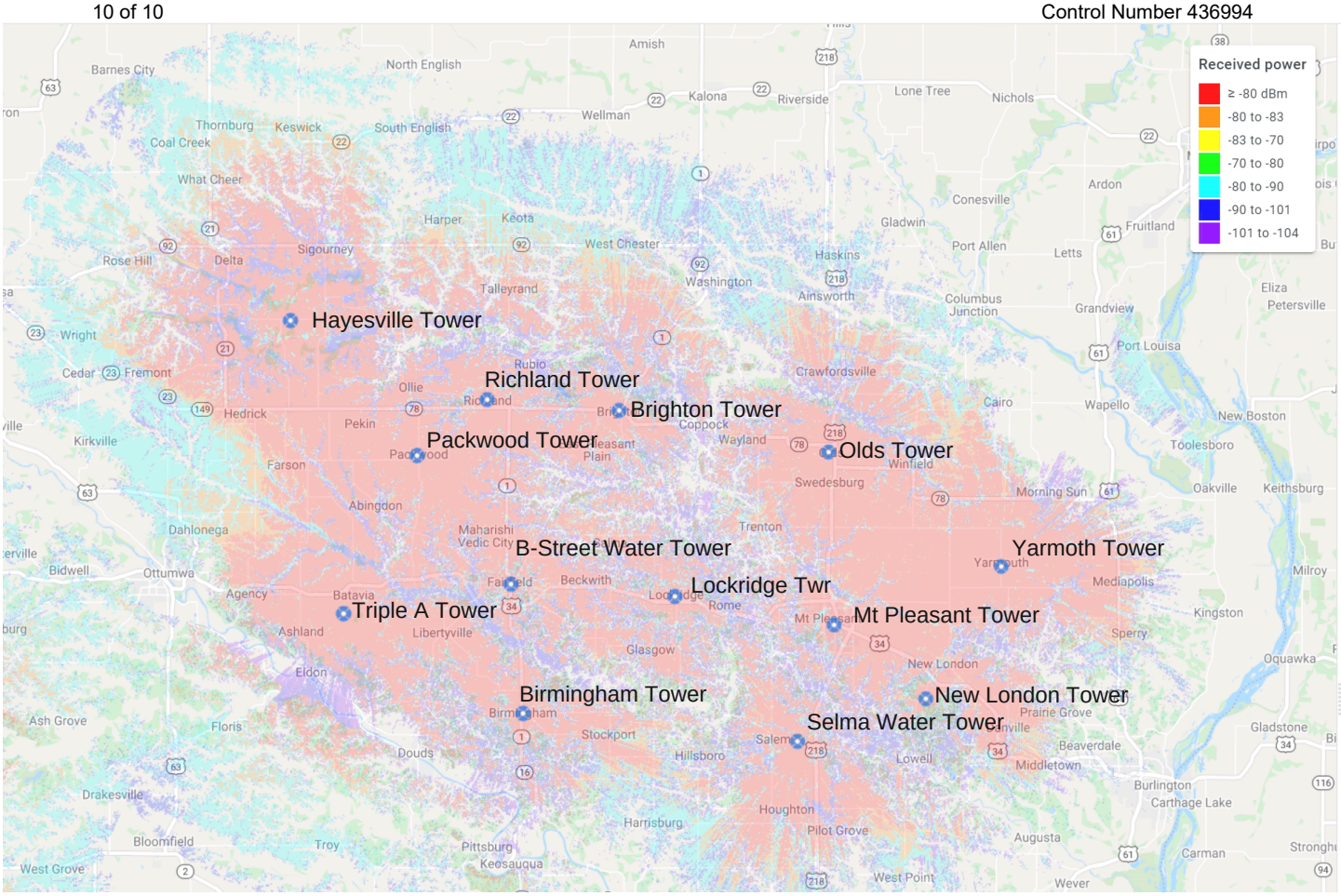
4.7 Potential Service Feeds

B-Street Water Tower	Approx. 100 Users, 135 ave. if all subscribe
Birmingham Tower	Approx. 100 Users, 135 ave. if all subscribe
Triple A Tower	Approx. 100 Users, 135 ave. if all subscribe
Packwood Tower	Approx. 100 Users, 135 ave. if all subscribe
Haysville Tower	Approx. 100 Users, 135 ave. if all subscribe
Richland Tower	Approx. 100 Users, 135 ave. if all subscribe
Brighton Tower	Approx. 100 Users, 135 ave. if all subscribe
Lockridge Tower	Approx. 100 Users, 135 ave. if all subscribe
Olds Tower	Approx. 100 Users, 135 ave. if all subscribe
Yarmouth Tower	Approx. 100 Users, 135 ave. if all subscribe
Mt Pleasant Tower	Approx. 100 Users, 135 ave. if all subscribe
Salem Tower	Approx. 100 Users, 135 ave. if all subscribe
New London Tower	Approx. 100 Users, 135 ave. if all subscribe

Note: Each tower has 4 sectors which support up to 200 users



Map shows proposed project:
Red circles – 10 mi radius
Small green – tower sites
Green lines – wireless backhaul
Yellow and orange lines are ESA and Non-ESA fiber paths



436994 Project Propagation Map – shows full coverage of project area, red is excellent, -100 level is still a solid link