

ARDC Grant Application Form--- April 2021

Title: The Oregon HamWAN Backbone Project

By: The Cascade Amateur Radio Society (CARS) dba Oregon HamWAN

Grant Proposal:

A. The Oregon HamWAN Backbone Project-

We are applying for this grant to fund the deployment of HamWAN in Oregon. Specifically, we are applying to fund deployment of 12 HamWAN backbone distribution sites between Portland and Salem, Oregon to extend the Puget Sound Data Ring, which currently extends from Seattle to Vancouver Washington, from Vancouver Washington to Salem Oregon, plus additional equipment for education and demonstration purposes.

HamWAN is a technology that supports high speed Internet connectivity (over 100 Mbps between backbone distribution sites, and up to 10 Mbps to each client node) over amateur radio using the 5.8 GHz band. Since HamWAN requires line of site communication, an effective HamWAN network requires deployment of HamWAN backbone distribution sites on towers. HamWAN supports a range of up to 50 miles between towers.

Each HamWAN site typically consists of three HamWAN Distribution Sectors, each offering 120 degrees of coverage, and typically one or more point to point links. A HamWAN site may also include a server supporting email, web, IP telephones, etc., and may include an Internet gateway (hardwired or satellite). Every HamWAN site should include provisions for good emergency power. The KOIN TV Tower Site in particular offers us unlimited Rack Space and its generators can power the site for two weeks without re-fueling. It is the most hardened site, so we will put the network servers there.

The value of HamWAN comes from the ability of amateur radio operators to setup mobile or portable HamWAN nodes, which can be aimed toward the nearest HamWAN Distribution Site to provide emergency communication via Internet during disasters. Such a mobile or portable setup requires HamWAN equipment costing less than \$100, as well as an inexpensive WiFi router and a 12 Volt battery.

Oregon is at extreme risk of a major Cascadia Subduction Zone earthquake. In the hours immediately following a disaster, when the Internet, landline, and cell phone communication is likely to be disrupted, effective communication between volunteers, first responders,

hospitals, and government agencies is critical. Amateur radio has always played a vital role. Unfortunately, voice communication is slow, and traditional digital communication such as Winlink has severely limited bandwidth. The ability of amateur radio operators to setup portable HamWAN nodes throughout affected communities, and communicate effectively via email, including attachments, would add tremendous value.

Since we plan to install servers at the KOIN TV tower, we will be able to provide email service within the disaster area even if all outside Internet connectivity is lost. Our web server will host maps, personnel directories, and other high value documents that might otherwise be unavailable during a disaster. Allowing those who are not licensed amateur radio operators to speak directly with one another using VOIP telephones would provide additional value.

Background-

The Cascade Amateur Radio Society (CARS) is a peculiar club. We provide Infrastructure for the Amateur Radio Community. We have 9 Repeaters for General Ham use. We join in Emergency Communications Projects with many local CERTS, ARES, and even Church groups. CARS works directly to support the EmComm efforts of over 1200 Hams in the area.

When many Oregon Hams expressed interest in starting a HamWAN Project, CARS stepped up and funded over \$6,000 for some equipment and coordinated experimentation. Seeing the need for a corporate entity to further the HamWAN cause, CARS officially registered the dba of "**OREGON HAMWAN**". CARS is a 501(c)3 and carries ARRL Liability and Theft Insurance to protect the Project and its members. Over 80 hams, many IT Professionals, have agreed to help in positions in the Project. We have the core IT People we need; we just don't have the money to implement the plan.

Prior to COVID many of the local radio tower sites allowed trained and certified Ham volunteer Tower Climbers to install equipment on their TV/Radio Towers. We planned on using our volunteer Tower Climbers. However, since COVID most commercial site managers/owners now require the use of their approved commercial climbing companies. This adds about \$12,000 to the cost of implementing the Oregon HamWAN. It also can add several months to the installation of projects.

Timing:

We have decided on a Project Manager, who will be in charge of Scheduling this project. He will have weekly contact with each Committee Chair to encourage, persuade, and 'gently nudge' as needed. He has been a Project Manager before, and will keep us on schedule. Our

intent is to have the full Network up and running within 12 months; however, because of known issues with scheduling the professional tower climbers that we have to rely on, we are requesting 18 months to complete it.

Covid should not be much of an issue now that everyone is eligible to get the vaccine. Still standard precautions will be used. Not everything is bad from COVID. It taught us the benefits of Zoom meetings. Primarily, it can save time. Transcripts of the meetings help also.

Project Summary:

When funded, we will build out the 60+ mile Oregon HamWAN System from Vancouver, Washington to Salem, Oregon using 12 Sites. We will follow two separate pathways from Vancouver to Salem. It will cover the Portland Basin (Multnomah, Clark, and Clackamas Counties), the Tualatin Valley (Washington County), and the Willamette Valley (Marion and Polk Counties). Because of siting and terrain, it will also upgrade the HamWAN Network coverage in much of Clark County (including Vancouver) Washington. That encompasses the majority of Amateur Radio Operators in Oregon. This will be the High-speed Digital Backbone that we need to foster experimentation, build interest in Amateur Radio, and to modernize the look of Amateur Radio. Oregon has many MESH Digital Groups. HamWAN will help bring them together and provide services to make Ham Radio truly relevant in 2021 and beyond.

If the amount we are asking for is too big of a barrier to funding us, we can scale the Project down from 12 Sites to 7 sites with a lower price tag. However, to do it right takes 12 sites. If we cut it back, its services will only be available to about one-half of the amateur radio operators that we plan on serving.

Interest in HamWAN and MESH is strong in Oregon. We've spent several thousand dollars and many hours on preparations. We have volunteers lined up to implement the plan. We know it will work. We know the time for it is now. It's truly a --- "**If you build it, they will come**" situation.

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B. Committees:

Prior to the COVID outbreak we split Oregon HamWAN implementation into several “Committees”. Each Committee has a chairperson and a group of volunteers that chose to work on that particular task. We have managers of small community Telephone exchanges. We have several Wireless Internet Service Providers (WISP’s). We have IT Managers from very large corporations. We have marketing and legal professionals. And we have people that will work at whatever we need help with. Over 80 people have volunteered to help make Oregon HamWAN a reality.

What are the Committees?

1. **Asterisk VoIP Phone Team** : We plan to provide a Ham Phone System that would allow calls to virtually anywhere in the World. It also has to have Voicemail, Caller ID, Call Forwarding, Conference Calls, Logs, Recordings, and use a Codec that is easy on bandwidth. It also must be able to operate within the HamWAN even if the outside internet is down. They quickly got three different servers going. Several of us tried the systems out. We can quickly implement VoIP Phones due to their testing and work.
2. **Internet Gateways (Sharing your personal Internet with the Greater HamWAN):**
Hams with different Internet Service Providers have volunteered to share their home internet connections with the Oregon HamWAN. We have researched how the Washington HamWAN Network has done this and we have worked out Load Balancing, Bandwidth Limits, and Roll-over issues. Day Wireless and the BN/Union Pacific have offered us a link into their internal data Networks as a backup too. The Grant requests funding for one year of the StarLink satellite Internet service (\$499 for Equipment and \$99/month for 12 months) and one year of 4G LTE Internet access (through Beacon at \$135/year) to add redundancy to the Network. We are ready to go.
3. **Legal and Insurance:** CARS will continue to carry insurance on our equipment to cover Liability and Theft through the ARRL’s insurance program. CARS has been faithful in doing this. Negotiations, Internal Forms, Waivers, and Site contract reviews will be done by our two members that are attorneys. Both have extensive experience with contracts.
4. **Help Desk and Customer Service:** This Team has started with a core of IT Professionals and will expand as the Network steps up. A “Repair Ticket” type system has been researched and will be implemented. They will also work as mentors to new Network members. On our Website (www.OregonHamWAN.org) we have created and published a program that streamlines the configuration process for end-user’s equipment. Instead of typing lines and lines of code, it asks a few relevant questions and then spits out a configuration file that can be easily uploaded to the equipment. Getting new users up and running is a priority.

5. **Website:** We have a Webmaster and a design team that keep the site up to date. Affiliate Links will be added to help generate funds for operation of the Network. It will have an Equipment Store.
6. **Training Videos:** We have Cameras, Software, and Script writers lined up. Our new users will need training.
7. **Funding:** With this ARDC Grant the initial Oregon HamWAN Backbone will be created. We will then have something physical to show other potential grant givers. In the future we will need funding for expansion, to increase quality of service, and for maintenance. Our model is to provide Backup High-speed Digital Communications for our local Governments (through ARES) and the 27 Hospitals in the Portland/Vancouver/Salem area through the HEART amateur radio network. We will provide Emergency Communications whether they make donations to Oregon HamWAN or not. However, we will 'suggest' a \$1,000 per year donation from most of such entities. It's not a quid pro quo. And being in the various EOC's will strengthen the position of our ARES Radio Operators.

Another source of funding is Matching Funds. Intel, Nike, and several other local corporations will donate cash to non-profits based on the number of hours their employees donate to the cause. Washington County ARES receives nearly all of its operating funds from Intel's Corporate Giving. PayPal, Amazon Smile, Go Fund Me, Fred Meyers Charitable Giving, selling Merchandise, Affiliate Links, and other ideas will be pushed. We've earned several thousand dollars so far; but as you can see from our request, this endeavor isn't cheap.

8. **Budget Committee:**

Along with Funding goes Budgeting. Each committee has a person on the Budget Committee. We have bookkeeping software and at least annually we do an in-house audit. The CARS Treasurer has been the head of this committee; but once we get the ARDC Grant we will have a volunteer experienced bookkeeper involved as the Chair. Although we are Amateurs--- Money makes it happen. Budgeting gives us the targets we need to achieve.

9. **Marketing:**

We have a former marketing person from Nike. She has the ability to create our marketing materials; including flyers, YouTube Videos, PowerPoint Presentations, and other items to get the word out about HamWAN. We will target Ham Clubs, Schools, ARES, Served Agencies, and new Hams. The Network itself will be a great marketing tool. Part of the Grant Request is to create 5 Demo End-User units (for \$550 each). They will be used to Demo the Network often. We have seen that a hands-on demonstration

gets people interested more than anything else. We will Demo, and Demo, and Demo some more. We will also offer help to setup linked repeaters.

10. Membership:

We have a diverse and talented membership. We have created a database of each members skills, interests, and participation. It helps guide us when we need help on something. Along with Marketing, Membership will be Demonstrating the Network. Our current 80+ members are great, but more are needed. Membership Dues may be implemented; but the Network will always be free to the end-user. That's Amateur Radio.

11. Sites:

We have a long list of potential sites to get to down the line. However, the 12 sites in this proposal are the core sites that will make Oregon HamWAN immediately available down the I-5 Corridor. They are the biggest bang for the buck. The Chair of our Site Committee has experience with siting several Amateur Radio Repeaters and has pulled together a strong crew to evaluate the sites. It was hard for them to weed it down to just 12 Sites for this Grant; but they did it. These sites are 'got-to-have' sites. Once funding is approved, we will finalize the contracts for the Sites while we wait for the equipment to arrive. The Site Rents have been discussed and the 1st year of rent (for \$1,700) is built into the Grant Proposal.

Our central Network Services Servers will be located at the KOIN Tower site. It has about two weeks of backup diesel generator power available and is an excellent datacenter.

12. Experimental Projects:

Raspberry Pi, Arduinos, WinLink, APRS, Weather Satellite Data, MESH interconnections, and other gear. This committee is well represented.

13. Site Security:

Most of our sites are commercial sites and therefore quite secure; but this team will evaluate each site as we gain access and make security recommendations.

14. Network Planning / Administration /and Security:

This team is made up of IT Professionals that have a proven track record. They have created our IP Addressing System, Network Security measures, Network Design and troubleshooting. They do this for their Day Jobs. The lead is the IT Manager for KGW TV / Radio. He knows IT and has a vision for HamWAN. They have worked hard to make Oregon HamWAN compatible with Washington's HamWAN; but ours will function autonomously if needed.

15. Hardware/Site Installation Team:

Configuration of equipment, testing of the network, Repairs, Maintenance, Inventory, Purchasing, and getting things done. This team will be busy with the Grant. Each

member has hands-on experience with the MikroTik equipment. The goal has been to standardize the equipment so that the cookie cutter approach to the sites can be used as much as possible. Learn it once and repeat.

16. Scrounging Team:

Their job is to try to source useable equipment as cheaply/reliably as possible. Used Laptops. Used Network servers, routers, PDU's, switches, UPS's, and whatever. So far, we have procured 5 Servers through this team. Don't think less of this Committee because of its name. They perform a very valuable function.

There are several other teams that have done much to prepare for this project. Some of them are Email, BGP Partners, Network Services, Software, GIS/Mapping, Backup power, and such. There is a job or two for everyone.

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C. Other Support:

What other support is pledged on this project?

1. Four government agencies will not charge us site rent to be on their towers.
The other 8 Sites have reduced their Site Rent for us.
2. Intel and Nike will donate funds based on the number of hours their employees donate to the project.
3. CARS has already spent over \$6,000 on this for testing and preparations.
4. CARS dba **Oregon HamWAN** will-
 - a. Spend another \$2,000 for Miscellaneous costs outside of the Grant Request.
 - b. Carry the necessary Liability and Theft Insurance.
 - c. Cover equipment replacement and upgrade costs.
 - d. Cover the annual Site Rents after year #1.
 - e. Provide Site Security measures.
 - f. Maintain its 501(c)3 status to encourage donations.
 - g. Seek State/FEMA and UASI Grants.
 - h. Annually Inventory the equipment.
 - i. Recruit whatever manpower is needed on the project. We work directly with over 1,200 Hams.
 - j. Provide Website Content and hosting.
 - k. Provide sites for meetings.
 - l. Support the Funding Committee.

- m. Create an online store to facilitate purchase of end-user equipment.
 - n. Leverage its name and good will to get ARES and other groups on board.
 - o. Apply for grants from foundations to help with operations.
 - p. Work with individual sponsors.
 - q. Provide bookkeeping services.
 - r. Get the project done on time and on budget.
 - s. Demo the Network to Local Governments, ARES, and local Hospitals to provide service to them and seek funding. Our target is \$1,000 annually from each Hospital and Government Agency.
 - t. Take HamWAN Demos to the schools. Build up public interest.
5. Intel's Security/Preparedness Mgr. has expressed some interest in connecting HamWAN and their MESH Group. He has some discretionary funding to accomplish that.
 6. BN/Union Pacific has offered to let us connect to their In-house national Data Network.
 7. Day Wireless has offered to let us connect to their In-house Data Network that covers all the whole West Coast from BC to Mexico.
 8. Seek donations from users; but not pressure them. HamWAN is Free.