The ARRL Foundation Club Grant Application - Fall 2022

Grant Author

Author First Name	Nancy
Author Last Name	Austin
Author Email Address	resilientnancy@gmail.com
Organization Name	Newport County Radio Club
Author Mailing Address	PO Box 4941
Author City	Middletown
Author State	Rhode Island
Author Zip Code	02842
Author's Telephone Number	14019353070
Author's Call Sign	KC1NEK
Are you the grant author also the project manager?	No

Club Information

Club's Name	Newport County Radio Club (RI)
Club's Call Sign	W1SYE
Club's Mailing Address	PO Box 3103
Club's City	Newport
Club's State	Rhode Island
Club's Zip Code	02840
Club's Email Address	w1sye.ncrc@gmail.com
Year the club was established?	1945

Club Officers Information

Does your club have a President?	Yes
President's Name	Nancy Austin
President's Call Sign	KC1NEK
President's Phone Number	14019353070
Does your club have a Secretary?	Yes
Secretary's Name	Bob Beatty
Secretary's Call Sign	WB4SON
Secretary's Phone Number	14012699086
Does your club have a Treasurer?	Yes

Program Manager's Name	Paul Fredette
Treasurer's Name	Ted Wrobel
Program Manager's Call Sign	K1YBE
Treasurer's Call Sign	W1GRI
Program Manager's Phone Number	14013393024
Treasurer's Phone Number	14012908123

Club Information Continued

Is club	ARRL Affiliated
How many current members are in your club?	192
Upload a club roster (For security names and callsign only)	[NCRC Roster 10_31_2022](#)
Is your club a 501C3 or a 501C7 Not for Profit Organization?	Yes
If Yes, please upload a copy of your latest IRS or State Not For Profit Tax Return.	[W1SYE IRS 990-EZ 2021](#)

Project Information

Project Name	ARTEN (Amateur Radio Training Experiment Network)
Total Grant Request Amount	7,975
Project Summary	A pilot community engagement learning opportunity in the 1-10GHz Super High Frequency (SHF) ham bands at the intersection of amateur radio + mesh network technology. Our goal is to deliver a scalable learning pathway suitable for STEM education in schools, for upskilling civic groups, as well as established ARRL clubs seeking to engage Technician-license class and above.
Project Impact	Category: Programs to get Hams On The Air and Active Goal #1: Introduce Hams to low cost equipment to get on the air in the SHF bands Goal #2: Provide Hams the opportunity to be active by participating in a hands-on team project Category: Ham skills development and training projects Goal #3: Expose Hams to RF networking techniques Category: STEM learning through Amateur Radio and Youth Outreach Goal #4: Expose youth & adults to wireless communications concepts in the 1-10 GHz Goal #5: Expose youth and adults to environmental monitoring (other than weather) using CO_2 sensors and an Amateur Radio supported Internet of Things (IoT) Category: UHF+ Spectrum Utilization Goal #6: Provide Hams another opportunity to utilize granted SHF privileges

Project community support	Community support includes diverse cross-over audiences with whom we can communicate our enthusiasm about this pilot Super High Frequency learning pathway based on the CO_2 sensor mesh node use case. These communities include large demographics of all ages concerned about climate change, food resilience and sustainable agriculture across the many islands we call home in the vulnerable Ocean State of Rhode Island. Also, innovative groups working on edge computing nodes as part of a Zero Trust architecture may benefit from cross-over problem-solving insights from the radio community. Yet another outreach group could contribute to critical workforce development conversations at all levels (local to national) that need communicators to explain why it is imperative to prepare more RF engineers ASAP. Non-hams will benefit from exposure to wireless networking beyond cell phones and home networks. (When all else fails: Amateur Radio. Radio literacy is a foundational skill in the digital age.) Environmental data made available by the network will enable the study of localized CO_2 measurements. This project team includes a motivated writer who has a track-record of contributing to the ARRL-NE blog that further organically amplifies ARRL goals to excite the public to learn more about amateur radio and why it matters now more than ever.

Previous ARRL Foundation Grants Received Set Number 1

Date	09/22/2022
Amount	1,994
Purpose	This grant request is to provide funding for six Apple 10.2 inch retina display 64GB iPads with WiFi which will be added to our inventory of 20 Android Tablets, and 20 stylus pens to assist with their touch screens. Further improving our VE capabilities will help the club with membership and recruiting and continues our club revitalization program. This is part of our mutual relationship with a STEAM Academy (Middle School).

Project Plan

Select which of the categories below that your project will fall in to:	Ham Skills Development;GOTA Programs;STEM Learning & Youth Outreach;RFI Resolution UHF + Spectrum, Utilization
Upload the Detailed Spending Plan	[NCRC ARTEN Budget Detailed Spending Plan - ARTEN](#)
Upload the Project Narrative	[ARRL Club Grant Project Narrative - NCRC FINAL 31Oct2022](#)
Upload the Project Milestones	[NCRC Club ARTEN Grant Milestones - Milestones](#)
Club Revitalization Document Upload	

Certification

Terms and Conditions	I Agree
I understand	I Agree

I understand and agree	I Understand and Agree

Index	_Lastname	_Firstname	_Callsign
	Newport County Radio Club Roster 10/31/2022		
1	Adae	Brian	KB1ZAF
2	Aguiar	Joseph	KC1RJI
3	Allen	Devin	not a ham yet
4	Alves	Jared	KC1NDN
5	Anderson	Richard	KC1LKU
6	Anderson	George	KC1LOO
7	Anderson	William	KC1OMC
8	Anger	William	KB1WWX
9	Armstrong	Lee	KC1IPL
10	Ault	Elinor	NAHY
11	Austin	Nancy	KC1NEK
12	Bardsley	Robert	KB1WHE
13	Bardsley	Jack	KC1EQI
14	Bardsley	Charles	W1CRB
15	Barilow	Dustin	KC1RUH
16	Bartram	Peter	KQ1X
17	Bartram	Edna	W1PDL
18	Beatty	Robert	WB4SON
19	Bedford	Neville	W1ESQ
20	Belcher	Douglas	KC1NFL
21	Benker	Mike	KC1NFU
22	Bianco	Dick	KC1IPJ
23	Bohensky	Ross	KC1IPP
24	Bolla	Gary	N8ZFH
25	Bowen	Evan	K1GEA
26	Braga	Bruce	W1UQN
27	Britton	Dan	KC1CZU
28	Brouse	Anita	KC1IPS
29	Brown	David	KC1AAA
30	Brown	David	KC1GPA
31	Buss	Kevin	N1KMB
32	Byrne	Nolan	KC1RJK
33	Cain	David	W1DEC
34	Campbell	Paul	KC1DJO
35	Canham	Geoffrey	KC1KMI
36	Cardon	Bartley	KD1KG
37	Casassa	Ted	KC1NEU
38	Cashman	Timothy	KB1UZD
39	Cassidy	Bill	KC1NFM
40	Caswell	Kenneth	KC1RIX
41	Cerilli	Ben	WN1CGZ
42	Cloud	Tom	KB1ZZV
43	Clougherty	Jodie	KC1JRS
44	Cole	Peter	KC1QEB
45	Corbin	Bill	W3CJK
46	Cote	Steven	KA1MHA
47	Cottle	Brian	N1TBT
48	Crane	Penny	KC1ODL
49	Cullen	Mike	K1NPT
50	Cullen	Mac	K6MAC
51	Currey	Steve	KC1IPO
52	Daniels	Robert	KC1ODP

53	Day	Steven	N3VHI
54	Diiorio	Theodora	W1PUP
55	DiLuglio	Chuck	K1DA
56	Diorio	Chris	K1TCP
57	Duclos	Paul	KA1UQW
58	Dulac	Denise	K1WIN
59	Dumas	Carl	KC1NAM
60	Elliot	James	KA3UNQ
61	Emond	Dave	KC1IPA
62	Emsellem	Pat	KC1IPT
63	Estabrooks	Charles	K1ECU
64	Ferranti	Andrew	AB1BX
65	Fetters	Scott	W1YTF
66	Finger	Lou	KC1MJQ
67	Fitzpatrick	Charlie	KC1IPR
68	Flaherty	Mark	W1MBF
69	Francis	John	AA1JS
70	Fredette	Paul	K1YBE
71	Fredette	Dave	KC1EBB
72	Fusco	Peter	KC1CVY
73	Garforth	Jack	N1JK
74	Garman	James	KC1QDZ
75	Gaze	Ralph	W1RHG
76	Gibbemeyer	Mike	K1CW
77	Gilbody	Kevin	KG1HAM
78	Gladney	Arthur	N1AJG
79	Gosling III	Edward	W1NQH
80	Guinn	Eric	AC4LS
81	Guzeika	Henry	W1GUZ
82	Haefele	John	AB1YI
83	Hall	Alexander	KC1AQN
84	Hall	Thomas	KW1TOM
85	Hass	Daniel	KB1RON
86	Hennig	Eugene	KC1FXA
87	Henry	Keith	KC1LPV
88	Hobgood	Adam	K1OCD
89	Holloway	Tami	KB1ZZS
90	Hughes	Barney	AB1UE
91	Huth	Dave	KC1LON
92	Jackman	John	N1SMX
93	James	Michael	AC1GM
94	Janetatos	John	KD2LFN
95	Jones	Marilee	None
96	Kane	Stephen	KB1PPJ
97	Kesson	Chuck	N1CKT
98	Kline	Alan	KB1DJ
99	Kloewer	Katrina	KC1GUA
100	Kosinski	Jim	KJ6YKT
101	Lacross	William	None
102	LaCroix	Steven	KC1EAR
103	Ladin	Marc	KC1PBA
104	Lawless	Sheila	KC1JRT
105	Lazor	Jared	KC1NFW
106	Lemay	Gerald	VA2GLU
107	Lirakis	Chris	AA9AL

108	Lukowicz	Ryan	KC1KUF
109	Lynch	Jeff	WA1VQY
110	Macari	Anthony	KC1ODR
111	Mackie	Tom	W2ILA
112	Maclean	Hayden	KC1IPM
113	Maclean	Willy	W1LY
114	Mankofsky	Paul	KC1AQP
115	Mann	Jack	W1QZ
116	Manning	Bruce	NJ3K
117	Marro	Cat	KA9CAT
118	Marshall	Dave	KC1EXK
119	Martin	Michael	AC1DV
120	Matose	Robert	KC1RFM
121	Maupin	Matthew	N1TAG
122	McDonald	Dave	KC1JRU
123	McGiveney	Edward	WA1TFF
124	Meade	Stephen	KC1AQQ
125	Mello	Paul	W1PMM
126	Meltzer	James	WA2TNX
127	Messier	Don	KW1DON
128	Mills	John	K1JSM
129	Mitchell	Leeds	WA1GJF
130	Morris	Jared	KB1JRM
131	Morris	Bruce	W2RBM
132	Mosher	John	KC1JOL
133	Mueller	Mark	KB1RYX
134	Nassaney	Mary	KC1ODO
135	Naugle	Howard	K1TZQ
136	Neal	Dave	W2DAN
137	Nebiolo	Mary	KC1NEB
138	Nickerson	John	KB1LLN
139	Nuzum	Jay	N1CFY
140	O'Malley	Thomas	K1RDY
141	Peirson	Harry	KC1CWA
142	Perlmutter	Lauren	KC1PKI
143	Perry	Ray	KC1IPC
144	Pick	Donald	KC1NAX
145	Posk	Joseph	W1JPP
146	Powell	Jim	KC1IHC
147	Pudloski	John	N0SWO
148	Quinn	David	KC1ODE
149	Quintal	Allan	KC1IPK
150	Quintal	Ashley	KC1ITC
151	Rauschenbac	Kurt	KC1LDO
152	Recupero	Paul	KC1RJC
153	Reynolds	Heather	N1HJK
154	Richard	Jeff	N1GF
155	Rotondo	David	WA1YDH
156	Rousseau	Mike	KC1NEJ
157	Rudd	Mark	KC1LOM
158	Russell	Richard	KC1ARO
159	Rust	Alexandra	AE0DN
160	Sagamang	Jason	AC0CQ
161	Sagamang	Kathryn	KC1CVZ
162	Sammons	Jim	KA1ZOU

163	Seil	Mike	AA1XQ
164	Sendrak	Jim	KC1LYG
165	Silverzweig	Paul	W1PJS
166	Skorvanek III	Michael	WA1KSN
167	Soetbeer	John	KC1JOI
168	Staub	Andrew	KC1OKI
169	Strong	Patricia	KC1RJD
170	Sullivan	Emilee	KC1HOU
171	Taylor	Jeremy	K1JST
172	Thibault	Corry	KE1AK
173	Thibault	Crystal	KE1KAT
174	Tillotson	Scott	WX1X
175	Travers	Rich	N1ZSR
176	Tummins	Patrick	NAHY
177	Updike	Adria	KC1LOK
178	Valenti	Domenic	KC1MZA
179	Vecoli	John	KC1KOO
180	Vincent	Gina	NAHY
181	Wade	William	KO4DLO
182	Weeks	Arthur	W1AGW
183	White	Matt	KA1BQP
184	White	Robert	KB1ZZU
185	White	Alexander	KC1HOV
186	Whol	Robert	KC1IPQ
187	Whol	Jack	KC1ITD
188	Worth	Kelly	K1GKW
189	Wrobel	Ted	W1GRI
190	Wynn	Paul	AC1DW
191	Zaminer	Scott	KC1JRV
192	Zawistowski	Clare	KC1LOL

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Form **990-N**

Department of the Treasury Internal Revenue Service

Electronic Notice (e-Postcard)

for Tax-Exempt Organization not Required to File Form 990 or 990-EZ

OMB No. 1545-2085

2021

Open to Public Inspection

A For the **2021** Calendar year, or tax year beginning **2021-01-01** and ending **2021-12-31**

B Check if available

☐ Terminated for Business
☑ Gross receipts are normally $50,000 or less

C Name of Organization: **NEWPORT COUNTY RADIO CLUB**
BOX 3103, Newport, RI, US, 02840

D Employee Identification Number **05-0497680**

E Website:

w1sye.org

F Name of Principal Officer: **Ted Wrobel**
BOX 3103, NEWPORT, RI, US, 02840

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The time needed to complete and file this form and related schedules will vary depending on the individual circumstances. The estimated average times is 15 minutes.

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Budget Detailed Spending Plan

Club Name	Newport County Radio Club
Address	P.O.BOX 3103, Newport RI 02840

Completed by:	Paul H Fredette K1YBE, Project Manager
Date Completed	10/31/2022

Item #	Expenditure Item Short Title	Budget Amount	Expenditure Explanation	Timeline for Spending
1	UVNA-63	3,500.00	Major enabler for education initiatives (includes shipping)	Jan-23
2	Environment sensors	2,220.00	Needed for environmental monitoring	Mar-23
3	4 Raspberry PI compu	160.00	Needed for Weather node control and message formation	Mar-23
4	4 Solar power and 3D	720.00	Demonstrate renewables and remote sensing are possible	Mar-23
5	5 nanoVNAs (3 GHz) (	600.00	Provide hands on demonstartions	Mar-23
6	5 Yagi 2.4 Ghz antenr	75.00	Needed for node to node range (50% of nodes)	Mar-23
7	5 DIY antenna kits ($2	100.00	Needed for remaining nodes	Mar-23
8	Admin (printing, shipr	250.00	Some training materials will enhance outreach outcomes	Jun-23
9	3D printing supplies	350.00	Special parts will be fabricated with existing 3D printers.	Apr-23
	Total	7,975.00		

Insert additional lines above the "Total" line, as needed.

Project Narrative

Club Name: Newport County Radio Club

Your project may be simple or complex. Please use the questions below to describe the details of the project and how the grant would be utilized to make it possible.

TITLE: ARTEN (Amateur Radio Training Experiment Network)

A pilot community engagement learning opportunity in the 1-10GHz Super High Frequency (SHF) ham bands at the intersection of amateur radio + mesh network technology.

Transformative Impact

1. Describe the goals that you hope to achieve as part of your grant program. Be sure to emphasize how the achievement of your goals will have a transformative impact on your group, Amateur Radio operators around you, and your community. Please indicate the Grant Category or Categories that you program will address and be sure to outline your goals in each Grant Category. Also please note, in the questions which follow, the number of people outside your club that you expect to serve for each Grant Category.

   Answer:

Our proposed **Amateur Radio Training Experiment Network (ARTEN) project** addresses four of the eight ARRL Target Grant Categories. These categories are listed below along with their associated goal(s).

Category: Programs to get Hams On The Air and Active

   Goal #1: Introduce Hams to low cost equipment to get on the air in the SHF bands

   Goal #2: Provide Hams the opportunity to be active by participating in the team project

Category: Ham skills development and training projects

   Goal #3: Expose Hams to RF networking techniques

Category: STEM learning through Amateur Radio and Youth Outreach

   Goal #4: Expose youth and adults to concepts of wireless communications in the 1-10 GHz range

   Goal #5: Expose youth and adults to environmental monitoring (other than weather) using CO_2 sensors and an Amateur Radio supported Internet of Things (IoT)

Category: UHF+ Spectrum Utilization

   Goal #6: Provide Hams another opportunity to utilize granted SHF privileges

The ARTEN project was started at the Newport County Radio Club (NCRC) to provide a low cost of entry ($20 to $100) opportunity for club members to: (a) learn about and use HAM SHF bands and; (b) learn about RF networking techniques. Members have been meeting since early 2021 to test configurations of Amateur Radio Emergency Data Network (AREDN) mesh nodes (AREDN firmware programmed onto

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open source WiFi routers) in the 2.4 and 5 GHz bands and have used simple, low cost Vector Network Analyzer (VNA) equipment (like the *NanoVNA*) to showcase the measurements critical to wireless technologies.

Our grant includes three major parts. Grant funds will be used to purchase a number of mesh nodes. Grant funds will also be used to purchase measurement equipment. This hardware will then be used to develop project learning materials and presentation deliverables.

First, we will use grant funds to purchase low-cost weather-proof nodes (open source WiFi routers) similar to those mentioned previously. These nodes will demonstrate what can be built by deploying a network of sensors linked by mesh radio that will provide publicly available real time data on environmental parameters like variations in CO_2 concentration.

Learning how to easily deploy an ARTEN mesh with easy access to data from air composition, weather and soil sensors is expected to attract youth and upskilling adults that will need RF and network experience to fill looming technology workforce gaps. The ARTEN network plan is not emergency comms oriented and does not use encryption. The data collected by the sensors will be provided to local schools and other organizations to create awareness of the changes in their local environment. Radio literacy is a foundational skill in our digital age.

Second, we will invest grant funds in the purchase of measurement equipment to validate node performance. Since the use of RF measurements is critical to successful designs, the use of low cost VNA's was an early ARTEN project learning goal. Experimental and temporarily deployable antennas in the 30 to 3 cm range are practical with simple materials like yardsticks and paperclips. The deployment of RF equipment with wavelengths less than 1 foot can be challenging but the equipment to do it is readily available below 6 GHz. Simple antennas can be constructed but measurements in this range are typically done with expensive equipment found in research labs. It was recognized that while low cost equipment, such as the *NanoVNA*, now exists for VNA measurements below 3 GHz, the quality of those measurements could use a more accurate reference and learning tool. Therefore, it is necessary to add a quality VNA to the grant request. The *UVNA-63* (quote and datasheet attached) will provide useful data up to 6 GHz to compare with results collected previously with a low cost, entry-level *NanoVNA*.

The availability of such a 6GHz VNA that has training as a primary goal is now available and could be procured for about $3500 versus greater than $9000 for all other options explored. Given that this option would not be available without the grant, we consider this a transformative investment with far-reaching impact. The existing interest group at NCRC has expertise in fully leveraging the benefits of this superior measurement instrument and hopes to provide exposure and mentoring on the use of VNA's in wireless design and deployments. We recognize that this instrument is normally a university research tool but our General/Extra training programs have already breached this barrier. Indeed, just by having this instrument available we expect to attract interest and new volunteers based on the technical expertise in our area. In turn, our club's historic deep bench of technical expertise is a major draw for new less-technical members wanting to learn and be mentored in such an enthusiastic experimenter community.

Third, once established, the innovative ARTEN concept will be well documented to allow other clubs and communities to use the learning materials and presentation deliverables. All training materials and session recordings will be made available for free to the amateur radio community and specifically

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ARRL. In addition, the inclusion of non-amateur radio interest groups in our proposed pilot project use case will expose the hobby to broad audiences reached locally, via social media and especially as a Field Day training opportunity.

2. Describe your plans to provide training and skills development for hams and the public beyond the membership of your club. Explain how your project will enable and be coupled with your training and mentoring plans. Include an estimate of the number of people you plan to train within the first 2 years of your project.

Answer:

Our ARTEN project will be the subject of a Field Day 2023 technical lecture on goals, activities and accomplishments. This milestone will leverage NCRC's long history of Community Outreach through ARRL Field Day, other live events, and related social media communications.

Successful past training and skills development events that have impacted thousands include:

- a youth focus via the annual Scouting USA Jamboree On The Air (JOTA); the recent (October 2022) **New England Jamboree at Fort Adams attended by 3000 regional youth Scouts**; previous ARISS contacts and ongoing youth radio club outreach facilitated through our connections with the local All Saints **STEAM Academy**.

- **cross-generational adult mentorship and training** via ongoing Technician, General and Amateur Extra classes; quarterly VE licensing sessions; ongoing knowledge sharing via nightly 2M VHF nets, weekly 80M HF nets, weekly breakfasts, monthly hybrid meetings and demos, and **weekly opportunities open to all to join in field testing the ARTEN components**. ARTEN's ham community outreach will benefit from NCRC's **established participation** and **knowledge-sharing within the ARRL-NE Mesh consortium** led by Rob Leiden K1UI, ARRL Assistant Director for Spectrum Protection & Utilization.

  Direct training during the first year will be about 3 times the number of students participating (75) plus about 20% of the club members (180 x 0.2 =36) for a total of 111. Monthly club meetings will expose another 50% of the members to status and at least one recorded presentation will provide further access to the materials for an additional 90. Field trips to the sensor sites will be encouraged. We would expect similar numbers in a potential second year.

3. Describe your plans to deliver Amateur Radio based STEM education in your community through your project. Please include an estimate of the number of groups you hope to serve with STEM education and the average size of the groups within the first 2 years of your project.

Answer:

Year 1: As previously mentioned, our ARTEN project will be the subject for the Field Day 2023 technical lecture. NCRC Field Day is held at a public park and open to the public; it is regularly visited by public officials and families. Attendance numbers for FD 2022 were at least 50 club members, 25 newly licensed Hams in the GOTA tent and numerous visitors including multiple local elected officials and served agency

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representatives. Typical pre-pandemic attendance figures were at least 32 club members, 3 youth operators and 10 visitors including at least one local elected official and served agency representative. Attendance for FD2023 is anticipated to be similar. Also, including ARTEN deliverables in All Saints STEAM Academy curriculum is under discussion. Middle school students (grades 5-8) involved in the radio activities at the local STEAM Academy number roughly 40 youths per year.

Year 2: Our goal is to deliver a pilot community engagement learning opportunity in the 1-10GHz Super High Frequency (SHF) ham bands at the intersection of amateur radio + mesh network technology. Year 2 goals would be to incorporate "Lessons Learned" to deliver a scalable learning pathway suitable for STEM education in schools, for upskilling civic groups, as well as established ARRL clubs seeking to engage Technician-license class and above.

4. Explain the steps that you are planning to involve minorities in your project and how your program will help to improve diversity in Amateur Radio within your group and your community?

    Answer:

The Newport County Radio Club is committed to diversity and inclusion, with demonstrated success helping to bridge the tech gender gap. New club membership in 2022 is about one-quarter women. The current NCRC President is a STEAM-educated woman and amateur radio ambassador advocating for this pilot project. In addition, NCRC has provided workshops to our local STEM4GIRLS event at UMass-Dartmouth University, as well as local MakerFaires. Additionally, All Saints STEAM Academy in Middletown, RI is a diverse elementary through middle school educational venue that the NCRC has collaborated with to deliver innovative radio/STEM hands-on learning opportunities for almost a decade. While the tech gender gap is only part of the puzzle, it's a start, and we walk the talk.

5. Estimate the potential number of people (hams and non-hams) that would benefit from the proposed grant program within the first 2 years of your project.

    Answer:

Writing this grant proposal has revealed more cross-over audiences with whom we can communicate our enthusiasm about the many facets of this pilot Super High Frequency learning pathway based on the CO_2 sensor mesh node use case. These communities include large demographics of all ages concerned about climate change, food resilience and sustainable agriculture across the many islands we call home in the vulnerable Ocean State of Rhode Island. Also, innovative groups working on edge computing nodes as part of a Zero Trust architecture may benefit from cross-over problem-solving insights from the radio community. Yet another outreach group could contribute to critical workforce development conversations at all levels (local to national) that need communicators to explain why it is imperative to prepare more RF engineers ASAP.

This broad strategy vision is backed up by these baseline estimates: Direct training during the first year will be about 20% of the club members (180 x 0.2 = 36). Monthly club meetings will expose about 50% of the members to status and at least one recorded presentation. Field trips to the sensor sites will be encouraged. Of course, more members of our growing 75 year old club may choose to participate. Other New England clubs with members participating in the ARRL-NE Mesh consortium will benefit from the inspiring ARTEN pilot through our existing relationship.

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6. Estimate the potential of your program to create growth in the number of licensed and active amateur radio operators within the first 2 years of your project.

    Answer:

Over the 18 months of current ARTEN activity we generated participation from 4 newly licensed Technician Class hams and inspired several upgrades to General and Extra. In addition, NCRC has regularly trained and tested about 30 prospective hams per year. This number is variable with free training classes being semi-annual and VE exams sessions held every quarter. Special VE sessions are created to maintain enthusiasm when classes complete outside of the quarterly schedule. In addition, approximately 15 middle school students were licensed through special training and VE exam sessions held at All Saints STEAM Academy.

It is anticipated that a similar number of newly minted Technicians will be engaged, 4 per year, in the proposed new project. It is hoped that community outreach and youth participation will inspire several new individuals to become licensed amateur operators.

7. How will your project benefit members of your community who are not hams? Estimate the scope (numerically if possible) of the benefit to the public.

    Answer:

Non-hams will benefit from exposure to wireless networking beyond cell phones and home networks. Environmental data made available by the network will enable the study of localized CO_2 measurements. Please also refer to the answer for question 5. This project team includes a motivated writer who has a track-record of contributing to the ARRL-NE blog that further organically amplifies ARRL goals to excite the public to learn more about amateur radio.

8. Discuss the potential of your project to protect and utilize amateur radio spectrum.

    Answer:

It is well known that amateur radio access to the 1-10 GHz bands is threatened by commercial interests. The ARTEN project gives hams another active use of this much desired spectrum. More broadly, the project is an opportunity to communicate to any number of audiences why amateur radio is a pathway to better understanding our spectrum-dependent future that is now.

9. What are your plans to create positive public awareness and support for Amateur Radio in your community as part of your project?

    Answer:

Please see all previous responses - especially Field Day 2023. Local media (TV, print and our area's extensive tourist information bulletins) will be provided with content on the club's activities and the environmental information will be a new twist on our other public awareness activities.

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10. Would you be willing to create content to help promote the ARRL club grant program? Please describe plans that you would be willing to commit to in this area. Please outline how you would utilize multiple channels including social media, Video, Print, Television, and other media outlets

    Answer:

Yes, we are a club actively committed to outreach and communication. Plans to accomplish this include marking all learning and documentation deliverables with "Made possible by the ARRL Club Grant Program" or words to that effect. Social media promotions will include ARRL Club Grant Program updates on the ARRL-NE blog and all NCRC media around Field Day 2023.

Please see, for example, an ARTEN related ARRL-NE blog posts:

https://nediv.arrl.org/2022/08/31/newport-county-radio-club-experimental-microwave-group-meets/

Execution Capability

1. Explain the number of volunteers that are required to execute your grant program. Please explain the source of the needed volunteer help and the level of committed volunteers that you have in place currently. Also, please explain your plans to secure necessary volunteer help that is not currently in place.

    Answer:

The team will consist of 5-12 volunteers currently organizing mesh testing activities. There are 10 total in the practicing interest group that have created personal mesh nodes. Club members are in place with sufficient engagement to successfully execute the proposed project. Additional volunteers are always welcome and tech savvy resources are available upon request from local establishments like the Naval Underwater Warfare Center (NUWC), University of Rhode Island (URI), UMASS-Dartmouth and the host of local Navy support contractors, tech companies, the resilience response community, and colleagues in other RI radio clubs.

2. Outline the role of and process used by key members of your club's leadership team in the following areas: 1) Securing volunteer participation in projects, 2) Administering and keeping records pertaining to the use of funds, 3) Developing plans and executing projects and schedules.

    Answer:

● We have regular informal breakfast meetings; monthly formal meetings; daily 2M nets; and weekly HF nets (totaling about 40 meets per month). These live events keep participants abreast of events and serve as effective volunteer recruitment opportunities. In addition, we communicate news and opportunities via regular club-wide emails and groups.io discussion forums. Our club president is a talent coach who listens for member's interests and connects them to club opportunities, helping recruit our generational leadership transition underway.
● We have a Treasurer and a bank account that is reported monthly and audited annually.
● Our Executive committee meets monthly with minutes and committee reports. Our Field Day(s) history speaks volumes of our organizational skills.

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3. Describe a project or program that you have successfully executed during the previous 5 years of similar scope, financial value, volunteer levels, and complexity. Describe the goals that you achieved, and the scope and makeup of the people served.

    Answer:

Every year since 2012, with the exception of the first COVID year, NCRC has hosted Scouting USA's Jamboree On The Air (JOTA). NCRC's commitment to JOTA is of similar scope, financial value, volunteer levels, and complexity to that of ARTEN.

The event is typically attended by three Boy Scout Troops and Cub Scout Packs averaging over 50 scouts and 10 adult leaders. An average of 20 Merit Badges are awarded each year. 32 Merit Badges were minted in 2022. The event has the services of roughly 12 club volunteers and $1000's of dollars of personal equipment (at least 3 get on the air stations, as well as, AV and demonstration test equipment for the Radio Merit Badge class).

Planning, executing and reporting on JOTA is an 11 month process similar in complexity to the proposed ARTEN project. Typical planning begins in January with securing the venue for the event. The February NCRC meeting recommits the club to the event. March begins outreach to potential Troops and Packs. May secures the club's insurance liability waiver for the event. No JOTA planning is scheduled in June to allow the club to focus on Field Day. July through September is used to finalize volunteer/equipment commitments and Troop/Pack attendance. JOTA is executed the third full weekend in October. Finally, November is used to document the event to Scouting, the ARRL Scouting representative and NCRC at the monthly meeting.

JOTA demonstrates NCRC's community outreach and youth Amateur Radio awareness goals. It allows NCRC to introduce the excitement of Amateur Radio to public service minded youths, adult leadership, parents, family members and their friends. As a direct result of JOTA, three Scouts and at least two adults have gone to get their Technician license through NCRC. Admittedly, these are small numbers. However, out of the 100s of youths we have interacted with over the years, we fully expect more to return to the hobby in their adult years.

We also were awarded a Tranche 1 grant to expand our digital VE license testing capability. This equipment (iPAD tablets) will also be used between VE test sessions as the user interface to the ARTEN project equipment and data, since access can be browser based.

4. Provide a detailed plan including a schedule with key milestones identified, a budget breakdown for the use of grant funds, and the numbers of and roles for the volunteers required to execute your project. Please use the budget and schedule templates provided.

    Answer:

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- **Schedule / Key Milestones**

Monthly from Successful Project Grant Approval

1. (Jan 2023) Project approved (Blog post); Purchase UVNA-63 and 2 of each node kit
2. (Feb) Project Plan update
3. (Mar) Build meeting for UVNA-63. (Blog post); Quarterly report to ARRL; Demonstrate UVNA on DIY antennas
4. (Apr) Build meeting for 2 Air Quality (AQ) nodes (recorded)
5. (May) Deploy 2 Air Quality (AQ) nodes in farm fields (Pictures for report)
6. (Jun) Field Day technical program (deliverable)
7. (Jul) Quarterly report ; Purchase remaining kits
8. (Aug) VNA class (Blog post)
9. (Sep) Quarterly report to ARRL
10. (Oct) Data collection review
11. (Nov) Mesh network review
12. (Dec) Revise remaining 12 month plan from results
13. (Jan 2024) Yearly report to ARRL; Highlight during NCRC 75th Anniversary as an ARRL Club (1949-2024)

- **Budget Breakdown**

UVNA-63	$3,500 (includes shipping)
Environment sensors	$2,220
4 Raspberry PI computers for Weather kit ($40 ea)	$ 160
4 Solar power and 3D printed case kits. 4x($105 + $75)	$ 720

https://shop.switchdoc.com/collections/skyweather2/products/solarmax2-solar-power-for-your-raspberry-pi-project

https://shop.switchdoc.com/collections/skyweather2/products/3d-print-for-smart-garden-system-raspberry-pi-and-garden-cam

5 nanoVNAs (3 GHz) ($120ea)	$ 600
5 Yagi 2.4 Ghz antennas($15ea)	$ 75
5 DIY antenna kits ($20ea)	$ 100
Admin (printing, shipping)	$ 250
3D printing supplies	$ 350
Grant request total	**$7,975**

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- **Volunteer Roles**

Project Manager (1)

Technical Advisors (2-3)

Implementation Team (up to 5 envisioned)

Outreach Coordinator (1)

5. Please identify any dependencies that you have for support by third parties from outside your club for the successful execution of your project. Please secure and attach letters outlining each required third party's commitment to supporting your project.

   Answer:

No specific 3rd party support is required beyond delivering hardware purchased with grant funds. To that end, the low-cost mesh nodes are available from scores of vendors and a quote for UVNA-63 is attached.

6. Discuss the risks associated with achieving the goals stated in your proposal. Also discuss the top risks you face in executing your program on schedule and within the planned budget. For each risk, outline your plans to mitigate or limit negative impacts.

   Answer:

We see limited risk. We consciously set clear goals we expect to deliver on. This is a pilot project with material deliverables we will turn over to ARRL and then review what is a best follow-up for the UVNA-63 and lessons learned.

- Equipment availability is low risk. Club participation to build and operate the initial sensor network is considered low risk. The plans to do a single farm site CO_2 sensor already exist with a club member.
- A CO_2 sensor project exists in the UK through Design Spark so we hope to piggyback on that open knowledge base but will welcome that project's participation once the grant has been approved. https://www.rs-online.com/designspark/designspark-air-quality-project
- The availability of team leads is mitigated by a deep bench of club members able to lead the project.
- Perhaps a top risk may be loss of access to spectrum? However, it is one of the stated goals of the ARTEN project to: "Provide Hams another opportunity to utilize granted SHF privileges."
- NCRC has among its members many experienced project managers and committee chairs from Field Day, JOTA, and VE sessions to name a few. We also have a cadre of past club presidents to call upon.

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7. Does your project require funding beyond what is outlined in your grant application? What other funding sources are you pursuing and what is the probability you will receive the additional funds? Have you applied for funds that duplicate or overlap those requested in your grant application? If so, please list the sources and requested amounts.

   Answer:

No, our project does not require funding beyond what is outlined in our grant application. We currently have a minimum of personal equipment to demonstrate a mesh network and collect sensor data. We have gaps in waterproof/fixed installation nodes and adequate test instrumentation. This grant will fill these gaps. Therefore, we are not pursuing other funding sources nor have we applied for duplicate or overlapping funds.

8. Discuss the funds that will be required to operate and sustain the project in your grant after the funds you are requesting have been exhausted. What level of on-going funding do you require and what is your plan for securing the necessary funding to sustain your project? If you are going to charge use fees to use the resources funded by your grant or existing resources directly enhanced by your grant, please explain these fees in detail and specifically relate the fees to ongoing costs directly associated with operating your project. Note that ARRL club grants may not be used for profit activities, commercial activities, or revenue generation beyond covering the direct costs for ongoing sustaining operations of the funded project.

   Answer:

Our goal for ARTEN is to deliver a pathway for others to expand on the concept. Our advocacy for a local mesh training network is part of the broader scope of new mesh networking activities across RI and the exceptional regional ARRL-NE mesh activity experimentation and knowledge sharing underway. We do not foresee the need for sustaining funds nor will we charge any "use fees" to access the ARTEN mesh or the collected data.

Finally and in summary: ARTEN (Amateur Radio Training Experiment Network) is a pilot community engagement and learning opportunity in the 1-10GHz Super High Frequency (SHF) ham bands at the intersection of amateur radio + mesh network technology. We are committed to providing accurate inspiring media to the ARRL-NE blog about this grant and our project goals.

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ARRL Club Grant Milestones

Club Name: Newport County Radio Club
Template Revision: Issue 1
Name of Author: Paul H. Fredette K1YBE
Date Submitted: 10/31/2022

Instructions: Please include milestones and owners for executing your project to completion. You should have milestones for each major step that you are planning to complete your project. Examples might include target dates for training plans, completing major equipment acquistion steps, assembly and testing of important equipment subsystems, etc. Note that you do not need to repate the dates for purchasing equipment that you covered in your budget but you should include a milestone for completing installation, setup, and testing of the equipment after you have it in place.

Date	Description	Why is this milestone important?	Who is responsible for completing the milestones	Milestone Dependencies
<xx/yy/zz>	<Brief description of milestone>	<Example why the milestone is important? What does important part of your project is accomplished?>	<Responsible person or group>	<Indicate anything that needs to happen for this milestone to be accomplished>
10/31/2022	Apply for Tranche 2 Level 2 Grant to fund ARTEN	Grant deadline	Paul Fredette K1YBE	
12/1/2022	Receive Grant Notification		ARRL	Apply for grant
12/15/2023	Receive Funding	Funds for the project	Treasurer, Ted W1GRI	Obtaining the grant
12/20/2023	Purchase UVNA-63	Major component for attracting interest in the project	Paul Fredette	Receiving Funding
1/18/2023	Configure initial CO2 nodes for purchase	Inclusion or latest technical input from the project team	Tech advisors	Weekly team meetings
1/27/2023	Purchase 2 CO2 node components	Create visible progress and prepare for deployment	Paul Fredette	Receiving Funding
3/13/2023	Build meeting for UVNA-63. (Blog post); Demonstrate UVNA on DIY antennas	Outreach event for project visibility	Paul Fredette	
4/7/2023	Deploy 2 nodes in farm fields (Pictures for report)	Proof of concept and start of data collection	Implementation Team	Delivery of components and assembly by the team
6/24/2023	Field Day technical program	Major public outreach event deliverable and data review	Nancy Austin KC1NEK, Team NCRC	
7/7/2023	Progress report to ARRL	Required by grant	Paul Fredette	
8/14/2023	VNA class (Blog Post)	Education initiative for RF design	Paul Fredette	
10/16/2023	Quaterly report to ARRL	Awareness of project status	Paul Fredette	
10/16/2023	Data collection review	Education initiative for school and public awareness	Paul Fredette	
11/13/2023	Mesh network review	Contribution for ARRL and clubs	Paul Fredette	
12/11/2023	12. (Dec) Revise remaining 12 month plan from results	Extablish 2024 goals	Paul Fredette	
1/15/2024	Yearly report to ARRL & Social Media	Deliverables	Paul Fredette, Team NCRC	
YR2: 2024	Highlight: NCRC 75th Anniversary as ARRL Club (1949-2024)	Tradition of Amateur Radio experimenters driving innovation	Nancy Austin KC1NEK	