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Our Vision: The NGEC provides national leadership in standardization, acquisition, and management of passenger rail equipment.

SECTION 305 NGEC 2023 Annual Meeting

MINUTES

FEBRUARY 2, 2024

8:30AM EASTERN

HYBRID

FACILITATOR	<i>Ray Hessinger, Chair S305 NGEC Executive Board</i>
ATTENDEES	<p>Board Members: Ray Hessinger, Joe Paul, Dan Ruppert, Melina Lopez, Mike Murray, Amanda Martin, Tim Ziethen, Troy Hughes, Jason Orthner, Jason Biggs, Richard Kedzior, Mike Jenkins, Brian Beeler II, Kyle Gradinger</p> <p>Support Staff and Colleagues: Steve Hewitt, Melissa Shurland, Charlie King, Kevin Myles, Dave "Mr. PowerPoint" Warner, Tammy Krause, Larry Salci, Patrick Centolanzi, Jon Dees, Strat Cavros, Jenifer Bastian, Lisa Stern Wisconsin DOT, Marci Petterson, CtDOT, Blair Slaughter, Amtrak, Tara Soesbee, Amtrak Ed Engle, Iowa DOT, Ryan Sharpe Caltrans</p> <p>Guest Presenters: Hamid Sharif, Univ. of Nebraska, Mike Kraft, Amtrak, Mike Welsh, Amtrak, Cody McClelland, Amtrak, Olivia Arant, Caltrans, Joseph Reynolds, Metro-North, John Batey, STV, Inc., Erika Santana, VIA Rail, Jean-Phillipe Quintal, VIA Rail, Joe Diliello, VIA Rail</p> <p>Industry Members: (See pre-meeting registration list) Total Attendance: approximately 85+ including virtual and in-person attendees with around 40 members of the industry.</p>
ABSENTEES	Board Members: George Hull

DECISIONS MADE

1.

Welcome – Ray Hessinger, NYSDOT, Chair, NGEC Executive Board:

After a hotel safety briefing, NGEC Chairman Ray Hessinger, NYSDOT, convened the 14th NGEC Annual Meeting and welcomed those attending in-person as well as those attending virtually.

2.

Self-Introductions:

Ray Hessinger, who was attending virtually called on those in the room and on-line to briefly introduce themselves and the entity they represent. Throughout the day there were between 45-50 in-person attendees and about 40-45 attending virtually (A total of 94 registered – see attached to these minutes).

Roll Call –Steve Hewitt, NGEC Program Manager:

Following the self-introductions Steve Hewitt formally called the roll of voting members of the NGEC in-person and on-line and confirmed the presence of a quorum with all Executive Board members represented.

3.

Review Meeting Agenda – Ray Hessinger:

Ray Hessinger reviewed the agenda within his chairman’s remarks.

Review the Meeting Packets – Steve Hewitt:

Steve Hewitt reviewed the meeting packets, noting that those on-line received the same items electronically. Steve highlighted the newly released NGEC 2024 background/educational document and thanked Missouri DOT for its graphic arts design of the “two-pager” and for printing the hard copies for the NGEC. He let those on-line and in the room know that additional copies will be available electronically and in hard copy by request.

4.

Approval of the Minutes from the 1-23-24 NGEC Executive Board Meeting– Ray Hessinger:

On a motion by Troy Hughes, MODOT, and a second by Mike Murray, FRA, the minutes from the 1-23-24 Executive Board Meeting were approved as presented.

5.

Chairman’s Report – Ray Hessinger:

Good morning, and welcome to the 2024 Annual Meeting of the Next Generation Equipment Committee. We are hybrid again this year as each of the previous hybrid sessions has been very successful and had significantly higher participation than exclusively in-person meetings. Today’s attendance is nearly equally split between those here in person and the remainder spread out around the country and world, participating remotely.

I want to acknowledge my fellow board members from the States, Amtrak and the Federal Railroad Administration as well as invited guest presenters from Amtrak, the FRA, University of Nebraska, VIA Rail Canada and Metro-North. I also want to welcome our industry members who have joined us today, with a broad representation of manufacturers, suppliers and consultants, and any members of the public at-large who have joined us today.

Finally, I want to acknowledge Steve Hewitt and Dave Warner. Steve has been the NGEC’s Executive Director from day 1, and the NGEC would not be what it is today without Steve’s ongoing dedication to the organization. Dave is handling the technology again today, making this hybrid meeting possible. Thank you both for another year of your service to the organization.

The initial meeting of the Next Generation Equipment Committee was held in April 2010. After more than 13 years, the NGEC continues to see active participation in its Executive Board, its subcommittees and work groups by States, Amtrak, FRA and industry members.

This continued participation is strong evidence that NGEC members continue to see value in an organization that brings together the designers, suppliers, manufacturers, purchasers and operators of passenger rail equipment to collaborate in the development of specifications that are made available at no cost to any organization who wishes to acquire new equipment.

Furthermore, the majority of the effort put forward is done on a voluntary, uncompensated basis. That means our respective employers – both public and private – also recognize that value.

Today, the NGEC specifications are THE standard for intercity passenger rail equipment.

Looking back, I believe 2023 was a productive year for the NGEC.

Priority number one was to survive. Our federal grant funding expired at the end of September 2023 and a new source of funding needed to be found for the NGEC to continue its mission.

Amtrak applied to the Federal Railroad Administration for \$1.60 million in funding under the Consolidated Rail Infrastructure and Safety Improvement Program (CRISI) on behalf of the NGEC, while also pledging \$0.4 m in matching funds. This funding would have sustained the NGEC for a period of 5 years. A significant number of our members from both the public and private sector submitted letters of support to the FRA.

However, the FRA did not select the NGEC CRISI application for funding. Feedback from the FRA indicated that Amtrak had submitted a strong application, but the competition for funding in the CRISI program was too high and the NGEC application was therefore not selected.

In the end, Amtrak agreed to fund the activities of the NGEC for federal fiscal year 2024 and we are grateful to Amtrak and their Board of Directors for this support. This effectively kicks the can down the road one year, as the NGEC still does not have a long-term funding source.

We will continue to explore all available funding opportunities, which at minimum will include re-submission of our CRISI application during the next round of funding opportunities.

With respect to the routine business of the committee we:

- *We completed an update and refresh of the NGEC two-page educational document for 2024, and this document is included in your meeting packet today.*

Progress was also made on our portfolio of specifications and guidance documents:

- The Bi-Level specification Revision D was approved by the Executive Board in February and finalized in May 2023.
- Reference Specification 305-901 Revision A (Public Address / Intercom Systems) was approved by the Executive Board in September.
- A draft Vehicle Weight specification was circulated for review and comment. A number of comments were received and the working group is beginning to address those concerns.

While the NGEN does not procure or own any rail equipment itself, we keep up to date on and receive regular reports from procurements that utilize our specifications. We will hear reports on a number of those procurements later in today's program.

We have a very full agenda for today's meeting:

- We will hear an update from Amtrak's Government Affairs,
- Mike Murray will provide a Federal Railroad Administration update,
- We'll then jump into some NGEN business with a financial report from our treasurer, Tim Zethan of Amtrak and updates from the Technical Subcommittee by George Hull and a Document Control report from Tammy Krouse

It's then back to the presentations:

- Hamid Sharif-Kashani of the University of Nebraska will provide an update on their High-Speed Wireless study.
- Olivia Arant and Kyle Gradinger will provide an update on California's Zero-Emissions Multiple Units.

We'll then review ongoing procurements, with presentations from Caltrans, Amtrak, Metro-North, VIA Rail and Connecticut DOT, to be followed by a review of vehicle performance of both the Charger locomotives and Venture cars from Illinois DOT, Caltrans, Wisconsin DOT and Amtrak.

All officers of the State Executive Board members are up for election, so we will receive nominations and hold elections for those positions and for a slate of officers as well.

Last, I'll provide a look ahead to 2024 and open the floor for comments and questions.

7.

Update from Amtrak Government Affairs – Cody McClelland, Amtrak:

Government Affairs - Update to the NGEN 2-2-24:

Funding Update

Annual (regular) appropriations are still essential!

- Amtrak's IIJA funding is reserved for specific capital needs; currently seeking ~\$2.45 billion in FY 24 annual grants.
- Much of FRA's IIJA Federal-State Partnership funding is already committed; momentum matters!

FY 24 appropriations decisions are happening now.

- CR for transportation (THUD) programs runs out after 3/1
- Bipartisan agreement on total discretionary spending (~\$1.66 trillion; non-defense roughly level YOY (nominal))
- Committees working on bills, but THUD allocation not yet public; implications for Amtrak & FRA grants still unclear.

IIJA Provides Supplemental Funding (\$66 Billion)

NEC: Amtrak + FRA Fed.-State: up to \$30 billion

Non-NEC: Amtrak + FRA Fed.-State: at least \$28 billion

Other FRA: \$8 billion

Policy Update

Amtrak continues to seek key policy changes.

- Reauth bills remain major vehicle for legislative changes; current authorizations last through FY 26.
- Meanwhile, Amtrak continues to seek IIJA technical corrections; stable long-term funding mechanisms; improved ability to uphold existing rights; and increased safety protections for employees, among other priorities.

Significant legislation is before Congress.

- Railway Safety Act of 2023 (S. 576 & H.R. 1674)
- Freights First Act (H.R. 3893)
- Policy provisions in FY 24 annual appropriations bills

Looking Ahead

Coming Soon

- FY 25 annual grant request & five-year plans
- NEC project delivery
 - Major funding commitments (\$32B by FY 26)
 - Important construction milestones
- Re-fleeting (network-wide)
 - Long-Distance equipment RfP
 - Airo trainsets procurement
 - New Acelas & ALC-42 Charger locomotives
- Corridor development
 - New Midwest & restored Gulf Coast service
 - Partner-led & Amtrak-led FRA CIDP selections
- Resilience and sustainability

Amtrak has a bright future. With Congress' and other partners' continued support, we can bring NEC assets into a state of good repair; expand State-Supported service; and sustain Long-Distance service for the next generation.

8.

Updates from the Federal Rail Administration:

Mike Murray provided an overview of FRA's Investments in New Fleet and Facilities Through the Bipartisan Infrastructure Law.

Below are highlights of the overview, with the complete presentation being available on the NGEN website at www.ngen.org

Bi-Partisan Infrastructure Law: Rail Funding Overview:
(Advance Appropriations)

From FY 22-FY26 = \$66B in total funding

Amtrak \$22B
CRISI \$5B
Railroad Crossing Elimination (RCE) \$3B
Fed-State Partnership (FSP) for Intercity Passenger Rail \$36B
Restoration and Enhancement \$250M

Long Distance Locomotives: Amtrak Procurement

125 Tier IV EPA Emissions Compliant diesel locomotives from Siemens thru the BiPartisan Infrastructure Law, to replace P-42 Locomotives for Long-Distance services.

Manufactured in Sacramento to Amtrak's Buy America 50% domestic content requirement.

Airo Trainsets

Base order of 83 trainsets with options for up to 130 additional trainsets.
Will debut in 2026 and operate throughout the country.

(3,500+ parts manufactured by nearly 100 suppliers in 31 states.)

Major Modifications to 17 Existing Facilities and Construction of 4 new Facilities
(see presentation map page 5)

Long-Distance Passenger Car Replacement

CY 2024 Tentative FRA Discretionary Grant Calendar:
(See presentation for calendar schedule page 7)

Brightline West? California Inaugural High-Speed Rail Service Report

FRA Rail Program Delivery Workshop – July 24 Washington, DC
Registration and Agenda coming in March 2024

When: July 30-31-2024

Where: Washington Marriott at Metro-Center

Meet FRA Staff

Foster Workforce Development and collaboration

Build a learning culture within today's rail industry.

Support RRD's mission to partner to advance effective rail investments.

Contact Us:

Federal Railroad Administration

1200 New Jersey Avenue, SE

Washington, DC 20590

Mike Murray

Transportation Industry Analyst

Office of Amtrak & Northeast Corridor

Office of Railroad Development

Federal Railroad Administration

Email: michael.murray@dot.gov.

9.

Treasurer's Report and Finance and Administrative Subcommittee (FASC) Update – Tim Ziethen, Amtrak – NGEC Treasurer and Chair of the NGEC Finance and Administrative subcommittee:

Tim Ziethen first provided an overview of the activities of the FASC in 2023:

Finance & Administrative Sub-Committee & Treasurer's Report

Updating the NGEC By-Laws

- The annual By Law review was conducted by the Finance and Administrative Sub-Committee (FASC).
- No changes were viewed as needed and this recommendation was approved by the FASC.
- On November 28, 2023, the Executive Board confirmed and accepted the recommendation that no changes were needed to the By Laws (as recommended by the FASC).
- Current versions of the By Laws are posted to the website. A copy is included in today's meeting materials.

Build Educational and Outreach Documentation

- Each year the NGEC has revised its two-page educational and awareness document and has distributed over 2,500 hard and soft copies and continues to keep this key document current with updates to equipment specifications.

- The document highlights the mission of the NGEC; its goals and results to date and reflects progress made in updating and keeping equipment specs current.
- The Executive Board approved the revisions in January 2024 and the 2024 version is included with your materials for the annual meeting and can be shared with the Stakeholder Community and Legislators. Copies may be requested by contacting Steve Hewitt at shewitt109@aol.com.

NGEC Website Refresh

- The new website is fully deployed and operating with the new NGEC website domain.
- Work was contracted (through AASHTO) with iEngineering to refresh the NGEC website, to improve viewer experience, and enhance public awareness of the NGEC and was completed.
- The new website is ngec.org.

Funding Status

- The current grant agreement has been amended as noted prior and extends the grant period through March 31, 2024.
- Funds under this grant have been exhausted as of the September 2023 invoice.
- Amtrak applied for a CRISI Grant at the end of November 2022 which was not approved. Feedback received indicated a thorough and comprehensive application however limited funding of CRISI projects (applications exceeded available funds) ending in no award.
- Amtrak is providing stopgap funding for FY 2024 as interim solution however long-term funding still needs to be identified.
- FRA NOFO for a new round of CRISI grants is upcoming and our plan is to submit an updated CRISI Grant request. Other funding options are being researched.

Treasurer’s Report:

- New (Current) Grant executed effective October 2016 and we are tracking against the SOW.
- Spending is consistent and is tracking at about \$15k per month.
- Grant Agreement performance period extended through 3-31-2024.
- Transition to Amtrak funding has occurred and no break in work activities is expected.
- The Committee can continue its work beyond the current Grant period with Amtrak providing interim funding for FY 2024.
- All current reporting and oversight is planned on continuing.
- Prior Grant Reference FRA-AMT-0010-17-01-00.

Treasurer’s Report - Summary Spending - Inception to Close of Grant

NGEC 305 Grant Reporting		
Current Grant - Period of Performance through 3/31/2024		
WBS C.CF.100674.0001	Technical Assistance	\$ -
WBS C.CF.100674.0002 / B.ME.100032.0001	AASHTO/Services	\$ 1,252,258.53
WBS C.CF.100674.0003	Administrative Task Force	\$ 4,478.84
WBS C.CF.100674.0004	Executive Board	\$ 793.29
Total Grant Spending Invoiced through September 2023		
Total Invoiced/Incurred		\$ 1,252,258.53
Other Administrative Expenses		\$ 5,272.13
Total Incurred for all WBS Line Items		\$ 1,257,530.66
Grant Total		\$ 1,250,000.00
Remaining Funds		\$ (7,530.66)
Estimated spend at current rate for balance of Grant		\$ -
Current Average Monthly Spend		\$ 15,150.97
Estimated Balance at End of Grant Period		\$ (7,530.66)

NGEC 305 FY 2024 Budget (As Presented and Adopted)

<u>Line Item</u>		Annual Total
Program Support	Program Manager	\$ 112,800
AASHTO Professional Services	Support Resources and Hosting	\$ 32,980
Technical Review Oversight	Key Industry Resource	\$ 23,000
Technical Review Mgmt.	TLK - Engr. Services	\$ 16,500
Technical Updates	Casamar - Technical Writer	\$ 22,320
Annual Meeting	Hotel and Support and Travel	\$ 16,000
Misc. Expenses	Various / Contingency	\$ 26,400
		\$ 250,000
Potential Carry Over Costs from Prior Grant		\$ 10,000
Approved Budget FY 2024 (Amtrak)		\$ 260,000

	Executive Board	Technical Sub-committee	Finance & Admin Sub-committee	"514" Equipment Capital Sub-committee	AASHTO Support Services	TOTAL
Labor		\$72,000	\$90,000		\$100,000	\$262,000
Meetings					\$90,000	\$90,000
Travel	\$0		\$10,000	\$0	\$90,000	\$100,000
Professional Services	\$0				\$682,000	\$682,000
Financial Review			\$100,000			\$100,000
Conference Calls					\$12,000	\$12,000
Webinar					\$3,000	\$3,000
Web Site					\$1,000	\$1,000
Other						\$0
TOTAL	\$0	\$72,000	\$200,000	\$0	\$978,000	\$1,250,000

Future Activities:

- Continue to explore funding opportunities that could be made available through the FRA while following the CRISI Grant process.
- Continue to provide educational information on the NGEC 305 Committee to sister agencies (SPRC, AASHTO, Amtrak), the industry, and Congress (when requested).
- Keep the new NGEC website current and useful.
- Explore additional options to increase awareness of the activities and benefits derived from the work of the NGEC.
- Conduct ongoing review and updating of PRIIA vehicle technical specifications; monitoring multi-state vehicle procurements; develop new vehicle specifications as identified, explore new technologies and identify additional lessons learned and ongoing updating of best practices.

Thank You!

Timothy Ziethen
NGEC 305 Treasurer
Amtrak
Sr. Director – Operations
ziethet@amtrak.com
(302) 661-6988

**10.
Acceptance of the NGEC Treasurer’s Report – Ray Hessinger:**

Following the FASC update and Treasurer’s Report, Chairman Hessinger called for a motion to accept the Treasurer’s Report as submitted.

On a motion by Richard Kedzior, Wisconsin DOT, and a second by Amanda Martin, Iowa DOT, the Treasurer’s Report was accepted by the NGEC Executive Board as presented.

**11.
NGEC Technical Subcommittee Progress Report – In the absence of George Hull, Joe Paul, Amtrak, and Vice Chair of the NGEC Technical Subcommittee provided the following presentation:**

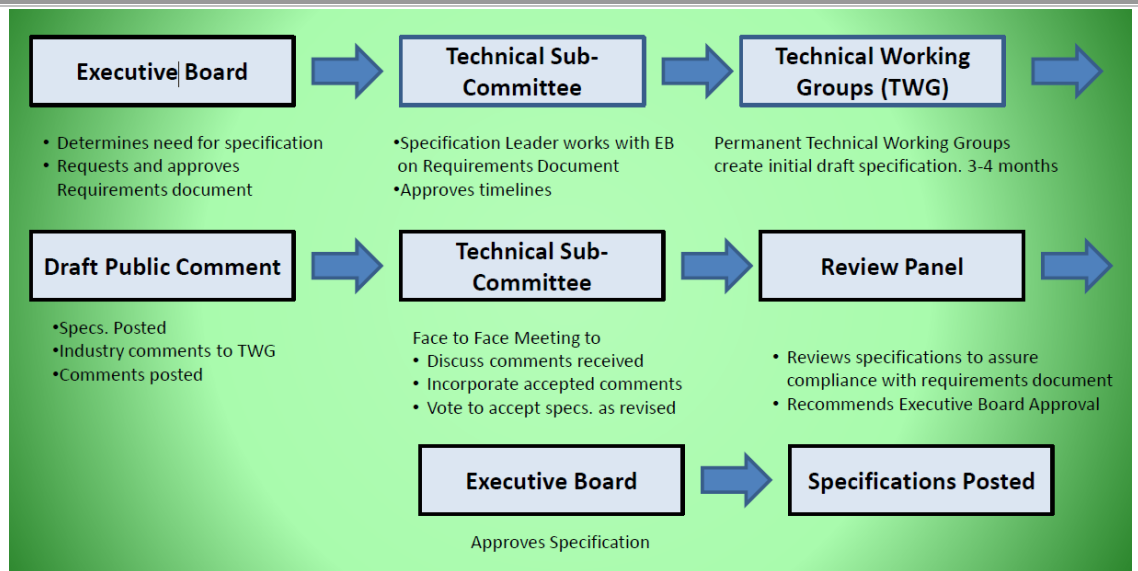
NGEC Technical Subcommittee and Specification Development:

Joseph Paul, Sr. Director Mechanical Contracts - National Railroad Passenger Corporation (Amtrak) and Vice Chair, NGEC Technical subcommittee:

PRIIA 305 Technical Subcommittee

- Main purpose is to develop specifications as requested by the Executive Board.
- Comprised of representatives from Amtrak, FRA, States, and rail equipment manufacturers and suppliers.
- Currently we have 11 states involved; California, Connecticut, Illinois, Iowa, Maine, Missouri, New York, North Carolina, Oregon, Washington and Wisconsin.
- Presently over 200 volunteer industry participants. Open to anyone from companies/consultants involved in rail.
- The majority of spec writing done by members of the 6 permanent working groups on a volunteer basis with support from a technical writer and the document control manager.

Specification Creation Process



Revising Specifications

New specifications are issued as initial release, version IR. A thorough process for managing change control and Revision approval is in place. This process can take months, typically DCR's are processed, and a specification is revised after several DCRs have been received.

- There is an Urgent DCR process to address issues that may come up during a procurement. This pushes a DCR through the system in less than two weeks.

Document Change Request Form (DCR)

- Changes can be proposed by anyone using a DCR.
- Evaluated by the TWG responsible for the section affected.
- Approved by the TWG.
- Approved by the Technical Subcommittee
- Sent to Executive Board
- Review panel reviews for compliance with requirements document.
- Executive Board approves.

Equipment Specifications Created and Updated To Date

- Bi-Level: Rev D – 02/2023
- Locomotive: Rev B – 06/2017
- Single Level: Rev B.2 – 02/2019
- Trainset: Rev B – 01/2022
- DMU: Rev A – 01/2022
- Dual Mode Loco: IR – 02/2016

Tech Subcommittee Active Efforts

- Active working Groups and Studies
 - Permanent Technical Working Groups
 - Structural, Interiors, Mechanical, Propulsion, Electrical, and VTI
- Carbody Materials Working Group
- Vehicle Weights Working Group
- Communications on Rail Cars Working Group
- University of Nebraska/FRA High Speed Wireless Study

Tech Subcommittee 2023 Highlights

- The PRIIA Bi-Level Specification 305-001 Revision D was adopted on 2-21-23.

12.

Document Management Progress Report and a look at the year ahead – Tammy Krause, Document Control Manager:



Specification Updates

- The Bi-Level Specification Revision D was approved by the TSC on 1/19/23, and the EB on 2/21/23.
- The Bi-Level Specification was updated to Rev D with 175 changes that were approved by the Working Groups and Technical Subcommittee.
- "De-Amtraking" of PRIIA Supporting Technical Specification 305-901 "Public Address/Intercom System" Revision A was approved by the EB on 9/5/23.

Single Level Specification

- The Single Level Specification Revision B.2 was approved by the EB on 2/12/19. This is the next Car Specification that will be updated by the TSC.
- The 175 changes that were made to the Bi-Level Specification will be reviewed for possible use in the Single Level Specification.
- One DCR for the Single Level has been received.



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Dual Mode Locomotive Specification

- The Dual Mode Locomotive Specification Initial Release was approved by the EB on 2/2/16.
- This will be the next Locomotive Specification to be updated by the TSC.



Working Groups

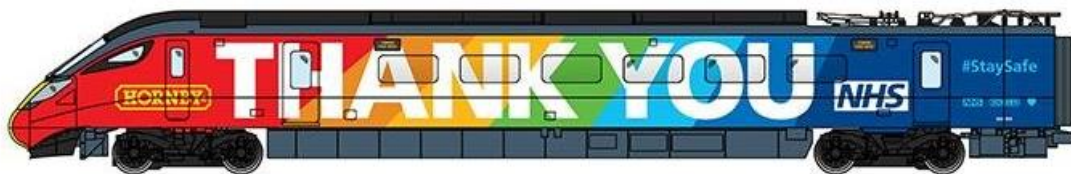
- Structural WG – Anand Prabhakaran
- Communications WG – Ken Martin
- Electrical WG – Tammy Krause
- Mechanical WG – Melissa Shurland
- Propulsion WG – Rich Stegner
- Interiors WG – Blair Slaughter
- Materials WG – Michael Gill
- Weights WG – Dave Warner (Acting)
- VTI WG – Brian Marquis

Working Group Updates

- Carbody Materials WG is continuing their work on evaluating alternate materials to Stainless Steel.
- Weight WG
 - Formed to evaluate the existing weight limits in the specifications and make future weight recommendations.
 - Proposed specification completed in Dec. 2023. Working Group Members
 - Last-minute concerns raised by industry representatives.
 - Rework is in progress.
- The Communications WG provided many of the changes to the update of 305-901 Public Address/ Intercom Systems.

Working Group Members

- I would like to thank everyone that participates in the WGs.
- We could do nothing with specifications and other documents without the support of these members.
- This is all done on a voluntary basis, and it is greatly appreciated!



13.

Presentation: High-Speed Wireless Study – Hamid Sharif, University of Nebraska:

Wireless Study: Investigation of 160MHz RF-Band Usage and Optimization

Michael Hempel, Pejman Ghasemzadeh, Hamid Sharif
Charles Vranek Professor, Electrical and Computer Engineering
Director, Advanced Telecommunications Engineering Laboratory (TEL)
University of Nebraska-Lincoln
February 2024

Outline

- An Overview of UNL's TEL Lab
- Introduction to Project
- RF Challenges in Rail Industries
- Solutions and Contributions
- Results
- Conclusions
- Publications

Overview of UNL's TEL Lab

- TEL is a part of the Electrical and Computer Engineering Department at the University of Nebraska-Lincoln.
- TEL is a research facility with state-of-the-art infrastructure in computing and communications.
- TEL is equipped with:
 - Real-Time Simulation platforms such as OPAL-RT,
 - Network Simulation platforms such as OMNet++, ns-3, QualNet,
 - Wireless capabilities such as Channel Emulator (Azimuth System),
 - High-Performance computing platforms,
 - Access to UNL's supercomputing infrastructure.
- Research Projects:
 - Wireless and RF Systems
 - Communication Networks
 - Cybersecurity
 - Sensors and IoT
 - Embedded System Design
- Projects supported by NSF, DOT, FRA, DOD, DOE, National Labs, and Rail Industries.

Challenges to RF Proliferation

- RF Resources need to be available across the industry's entire North American operating area.
- Limited Radio-Frequency (RF) spectrum resources in the rail industry
- Unlicensed bands highly congested
- Extremely expensive to license new RF bands.
- Example: Positive Train Control (PTC)
 - PTC primarily operates at 220 MHz.
 - Significant congestion in some areas such as: the Chicago area, Northeastern Corridor
 - Spectrum resources are limited within those areas, no additional channels are available, and coexistence problems when deploying additional PTC radios.

Solution

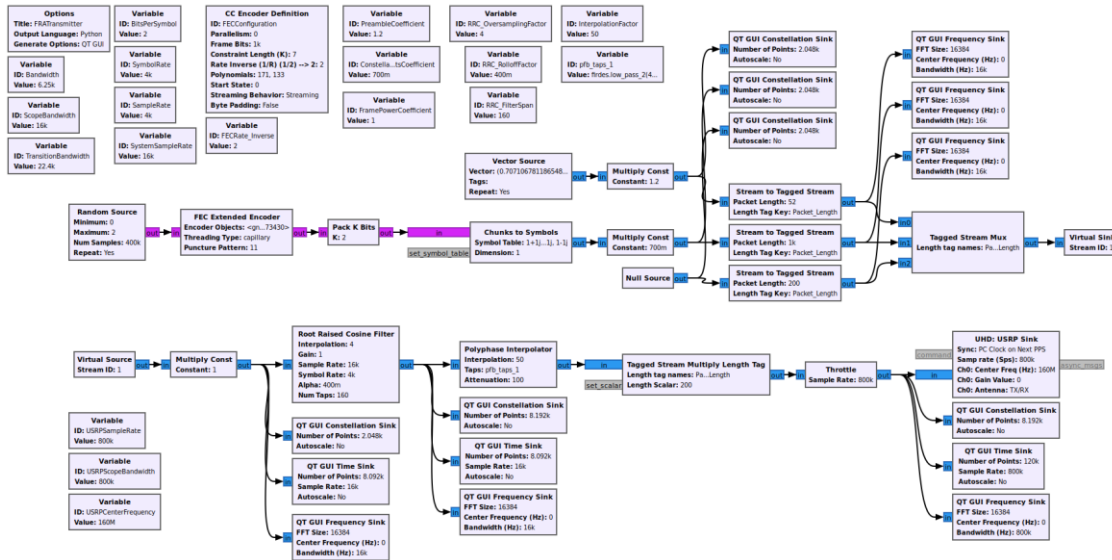
- Exploring the adoption of underutilized or abandoned RF bands for wireless applications development in the railroad industry.
- Evaluate the suitability of specific bands for voice + data applications, as well as providing additional operating channels for congested rail traffic areas.
- Specifically, study 160MHz for applications such as onboard signaling and long-range wayside communications.
- 160MHz is underutilized, but licenses are owned by the railroad industry across North America.

- Design and develop extensive computer simulation models to evaluate the 160 MHz communications system for railroad applications. Evaluate design using software radio prototypes.

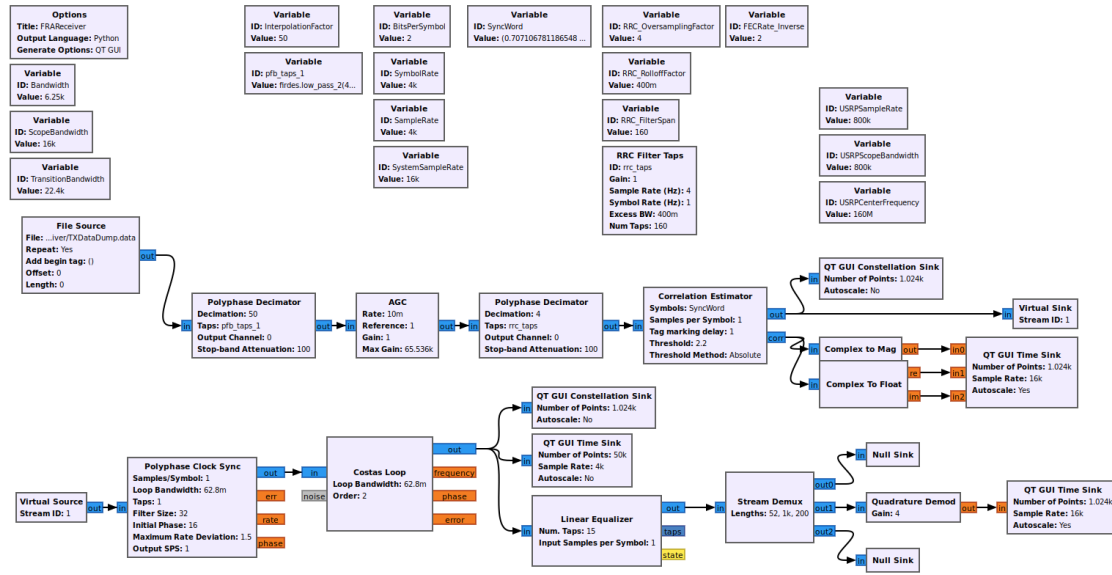
Contributions

- Simulation-driven performance Analysis
 - Single and multi-carrier (OFDM) transceiver
 - Railroad-applicable channel models
- Protocol stack model and analysis for railroad applications.
 - Analyze and maximize its end-to-end performance.
- Hardware implementation and evaluation using Software Radios
 - Implementing the designed system on USRP X310 & USRP B210
 - Prototype testing to validate the simulation-based analysis.

Prototype Implementation – Transmitter

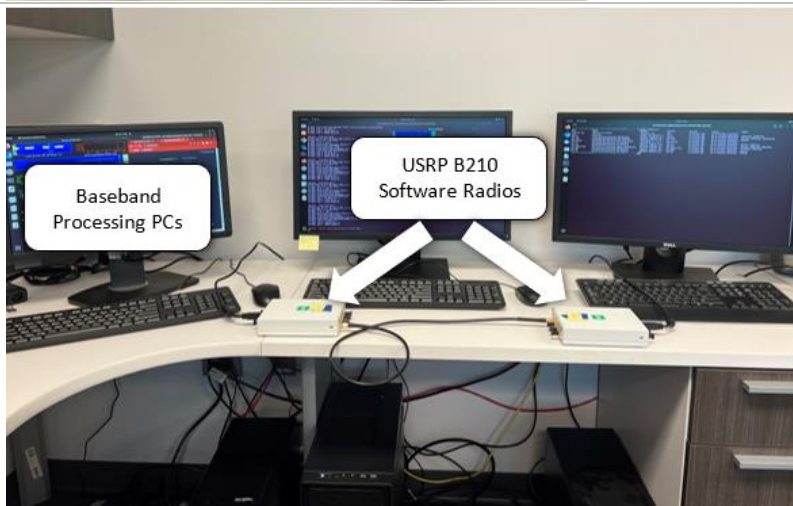
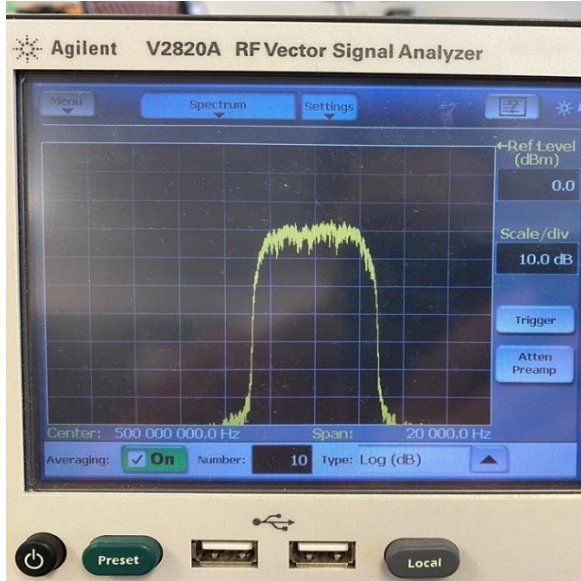


Prototype Implementation – Receiver

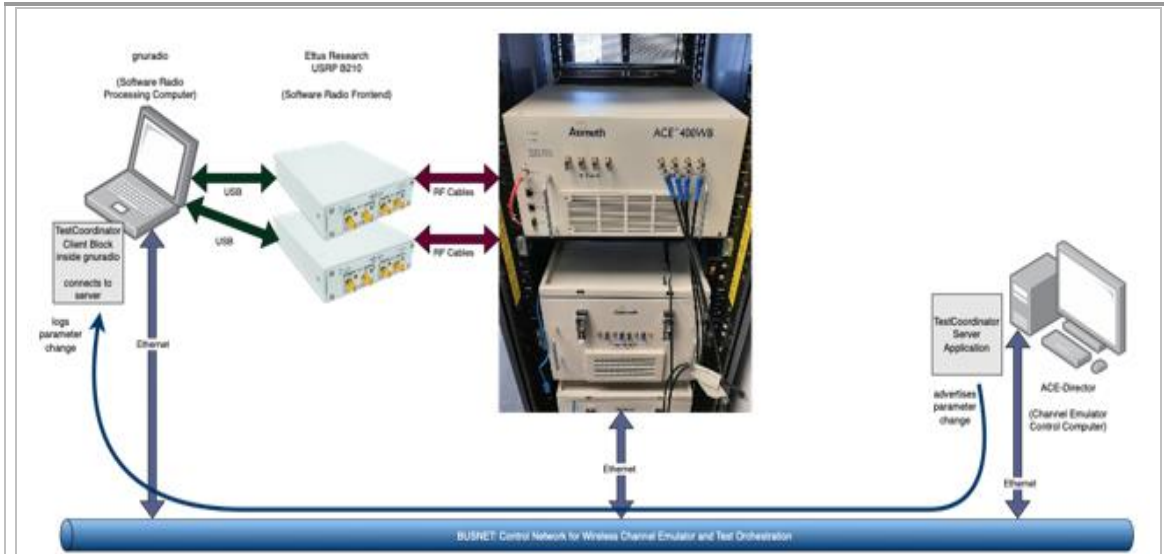


Prototype Implementation

- Transmitter and Receiver are being implemented on TEL Lab's USRPs for lab and field testing.
- Utilizes GNURadio Open-Source Software Radio Suite
- Effort aims to be modular and reusable.
- Also provisions Cognitive Radio capabilities.
 - Coexistence with primary services in the target RF band



Prototyping Setup in our Lab



Channel Emulator Setup and Test Coordinator Logging

Publications

- Ghasemzadeh, Pejman, Michael Hempel, Hamid Sharif, and Tarek Omar. "Maximizing RF Communications Throughput for Railroad Applications at 160 MHz." In *ASME/IEEE Joint Rail Conference*, vol. 85758, p. V001T03A004. American Society of Mechanical Engineers, 2022.
- Ghasemzadeh, Pejman, Michael Hempel, Hamid Sharif, and Tarek Omar. "Modeling and Performance Evaluation of an RF Transceiver System at 160 MHz for Railroad Environments." In *ASME/IEEE Joint Rail Conference*, vol. 85758, p. V001T03A005. American Society of Mechanical Engineers, 2022.
- Ghasemzadeh, Pejman, Michael Hempel, Hamid Sharif, and Tarek Omar. "An OFDM-Based Transceiver Analysis for Railroad Applications." In *2022 International Wireless Communications and Mobile Computing (IWCMC)*, pp. 748-753. IEEE, 2022.

Acknowledgment

This study is being conducted at the University of Nebraska-Lincoln by the faculty and students at the [Advanced Telecommunications Engineering Laboratory](http://www.TEL.unl.edu) (www.TEL.unl.edu).

This project is supported by the [US Federal Railroad Administration \(FRA\)](http://www.fra.dot.gov) under the direction of [Tarek Omar](mailto:Tarek.Omar@unl.edu) and contributions from Union Pacific.

Thank you!

For more information:

[Hamid Sharif](mailto:HSHARIF@UNL.EDU)
Advanced Telecommunications Engineering Lab
University of Nebraska-Lincoln
HSHARIF@UNL.EDU

14.

Presentation: Zero Emissions Multiple Units (ZEMU) – – Intro: Kyle Grading, Caltrans, Olivia Arant, Caltrans, Caltrans:

2024 NGEC Annual Meeting:

FLIRT H₂ Multiple-Unit Trainset Procurement Updates

Regulatory environment: Off-road vehicle fleets, including passenger trains, must be 100% emissions-

free by 2035.

- Our mandate from the governor is to have a 100% zero-emission intercity rail fleet by 2035.
- Rail timeline is more aggressive than other.
- This goal will ensure that rail retains its environmental advantage and remains competitive with other modes.
- Some modes are required by legislation to move towards ZE and others are mandated by executive order.
 - All bus purchases have to be zero-emission from 2029 onwards and the fleet needs to be zero-emission by 2040.
 - Only ZE cars can be sold in California from 2035 onwards.
 - The truck fleet will be ZE by 2045
 - The most ambitious requirements is that off-road vehicles need to be 100% ZE by 2035 – and this includes our intercity rail fleet.

Strategy: State's first ZE equipment procurement for deployment on Valley Rail



Range: Hydrogen will serve as the long-term primary power source for the Caltrans intercity fleet to achieve ZE

- Here is the high-level summary of our technology evaluation and the options that were considered to achieve our goals.
- Diesel, on the left, is the benchmark to allow the comparison to the other options. The technology that we have to replace to get to zero emissions.
- Complete wayside electrification is illustrated on the right, showing the other extreme to diesel, requiring significant modifications of the railway network, not just the motive power vehicles. The economical and right-of-way challenges for complete wayside electrification have rendered this option not suitable for our intercity fleet. However, where electrification is already installed or will be installed, we intend to make use of that infrastructure through dual-mode capability where feasible.
- The other possible options are shown between those two technologies.
- Four primary dimensions were evaluated.
 - The environmental impact, including GHG and criteria pollutants, and the general impact on the ecosystem, such as recyclability of components and effect on water resources.
 - Technical / operational performance, such as acceleration, maximum speed potential, tractive effort, recharge/refueling time, etc.
 - Economic considerations, including expected operational cost, such as expenses for fuel, and capital cost, such as vehicle purchases / retrofits and required wayside infrastructure.

- Synergize with other sectors, for example, possibility of common infrastructure with other modes, such as sharing of refueling stations or equipment with buses, and cross-sectoral, such as integration of energy storage possibilities with the power generation and utility sector, for example, how the technology could contribute to a SMART grid.
- The evaluated options were renewable diesel, natural gas, renewable natural gas, hydrogen, and batteries. These options were evaluated as the primary power source; however, hybrids are possible and will be employed.
- Renewable diesel has the advantage that it can be used in our existing equipment while reducing the environmental impact, particularly through the energy supply chain. However, it cannot lead to full zero-emission, which is especially problematic as most emissions occur as part of train operation in the form of exhaust gases, therefore it can only be an intermediate option. This is a suitable option for our intercity fleet to reduce GHG emission now, while working on the introduction of zero emission technology. Implementation efforts are underway, and trials have already been successfully completed.
- Natural gas can reduce exhaust emissions significantly but not to zero and relies on fossil fuel, it is also a potent GHG if leaks occur. Further, it requires new infrastructure that would have to be replaced before 2035 for us to achieve zero-emissions, therefore it was not considered suitable for our needs.
- Renewable natural gas is similar to natural gas, exhaust emissions occur as part of train operation, both GHG and criteria pollutant. However environmental improvements through the supply chain are possible, as waste products, such as landfill gas, can be utilized as feedstock. We would face the same difficulty with having to replace the infrastructure and motive power equipment in a few years to achieve zero emissions. Therefore, this option is not suitable to reach our goals.
- Hydrogen does not contain carbon and can be utilized in fuel cells that create electricity while the only exhaust is water. Hydrogen is an energy carrier and, therefore, can be produced from many feedstock including renewable sources. It is also energy dense from a weight perspective but requires more onboard storage space than diesel for practical ranges. It is significantly more energy dense than batteries and a vehicle can be refueled quickly, in a similar timeframe as diesel refueling. Performance of motive power regarding acceleration and power delivery is similar to diesel (actually, slightly better). The option can be economically attractive, especially compared to wayside electrification, and offers several synergies with other sectors. The combination of these characteristics make it our preferred solution as primary power option.
- Batteries offer good performance across most dimensions, but their energy density prohibits them from practical use in an intercity rail vehicle as several tender cars would be likely needed, or significant wayside electrification would be necessary. In addition, recharging times are long. However, their utilization in a hybrid powertrain arrangement is useful as they allow regenerative braking decreasing energy consumption and, for hydrogen, enable a smaller fuel cell system reducing powertrain cost.

New opportunities: FLIRT H₂ vehicles will be used to expand passenger rail service in California.

And here the FLIRT H₂ in more detail.

Caltrans developed a concept for a FLIRT H₂ vehicle for a 4-car train aimed at expanding passenger rail service in California.

Caltrans targeted characteristics are:

- Of course, Zero-emission operation
- Hydrogen while provide a relatively long range and enable fast fueling;
- Batteries allow for regenerative braking reducing energy consumption and provide power during acceleration and high-demand phases.
- The vehicle design is intended for vehicles to be deployed throughout the state, expanding passenger rail service in California.
- The targeted passenger capacity is ~250 seats.
- The targeted maximum vehicle speed is 90 mph.
- Our estimated maximum vehicle range is ~1000 miles for the 4-car.

As some may know, Caltrans, CalSTA, and Stadler executed a contract for design and delivery of 4x ZEMUS for Valley Rail with options.

This is the future of zero-emission technologies.

Project Status & Accomplishments

Successful contract signing & Notice to Proceed (NTP)

- Caltrans signed a contract to procure four (4) Stadler FLIRT H₂ in October of 2023
- Caltrans recently exercised options to expand the initial procurement with six (6) additional FLIRT H₂ trainsets.
- NTP issued for all ten (10) sets in January of 2024
- First design reviews expected to begin in September of 2024
- Drafted high-level Preliminary Hazard Analysis (PHA)
- Drafted initial preferred refueling concept.
- Drafted general stakeholder plan.

Questions:

Olivia Arant | olivia.arant@dot.ca.gov
Acting Chief, Office of Assets and Equipment

Ray Hessinger, NYSDOT asked if there is a limit on the size of the trainset with a single power unit.

Olivia responded that she was not sure of the limitation but they 5 or 6 cars with a single power unit and use two power centers 8 cars.

Darrell Smith, Maryland Transit Administration, asked if the hydrogen that is produced is green and how is the hydrogen being sourced?

Olivia responded that she would need to follow-up on this with Darrell.

15.

Update: Equipment Procurements:

The NGEC specifications have been used as the base spec for all new passenger rail equipment in recent years across the US and our neighbors to the north.

At each Annual meeting of the NGEC, we get updates on many of the key procurements that are ongoing and we learn about the progress they have made.

This year the following presentations were given:

- Multi-State Single Level Venture Cars – Ryan Sharpe, Caltrans
- Metro-North Dual Mode Locomotive Procurement – Joseph Reynolds, Metro-North Railroad
(Dedicated in memory of Lew Hoens Metro-North Railroad)
- VIA Rail Equipment Procurements – Erika Santana, VIA Rail and Jean-Phillipe Quintal, VIA Rail
- Connecticut DOT Passenger Rail Car Procurement – Marci Petterson, CtDOT
- Amtrak Fleet Procurements – Mike Kraft and Mike Welsh, Amtrak

As the files are too big to put into the minutes, these presentations are posted on the NGEC Website at www.ngec.org.

15.

Charger Locomotive and Venture Car Experience:

The first specifications developed by the NGEC were used in procurements across the US and our neighbors to the north. During each of the NGEC Annual Meetings since these procurements were begun, the entities involved in those procurements have given presentations to inform our members of their experience with the Charger locomotives and the Venture passenger rail cars.

In 2024 we heard about:

- The Amtrak Experience – Mike Kraft and Joe Paul, Amtrak
- The Mid-West States Experience – Melina Lopez, IDOT
- The California Experience – Ryan Sharpe, Caltrans
- The Washington State Experience – Jason Biggs, WSDOT

As the files are too big to put into the minutes, these presentations are posted on the NGEC Website at www.ngec.org.

16.

Report from the Nomination Committee/Election of State Executive Board Members and Officers:

Steve Hewitt, NGEC Program Manager/ Support Services Manager reported on the process for nominating State members to the Executive Board to serve two-year terms of office and the process for nominating and electing the State Executive Board officers.

Steve reported that he and the nominating committee, comprised of: Mike Jenkins, Oregon DOT, Troy Hughes, Missouri DOT, and Amanda Martin, Iowa DOT, met on January 9, 2024, and agreed to offer into nomination of the current States and their designated representatives for new two-year terms of office. After the states are elected to the Board, they will select their officers. As is the NGEC's precedent – the states have the officer positions of Chair and Secretary and Amtrak holds the Vice Chair and Treasurer's positions. On the Board Amtrak holds two seats and FRA holds one. The Amtrak CMO or his representative serves as the Vice Chair and as the chair of the Technical Subcommittee, and Amtrak also appoints its representative to serve as Treasurer and Chair of the FASC.

After summarizing the process, Steve Hewitt turned to Mike Jenkins, Oregon DOT.

Mike Jenkins, Oregon DOT, offered a motion to re-elect the current State Members and their designated representatives to serve new two-year terms on the Executive Board effective immediately. Troy Hughes, Missouri DOT seconded the motion.

Chairman Hessinger asked if there were any objections, hearing none, the Chair determined that consensus had been achieved and the current State members of the Executive Board are elected to new two-year terms effective immediately.

Mike Jenkins, Oregon DOT offered a motion to elect Ray Hessinger, NYSDOT as Chairman of the NGEC Executive Board for a new two-year term of office and to also elect Amanda Martin, Iowa DOT to serve a two-year term as Secretary of the Executive Board and second Vice-Chair of the FASC.

Ray Hessinger asked if there was any discussion or objection. Hearing none the Chair determined that consensus had been achieved and the motion was adopted.

Steve Hewitt reported that, prior to the meeting, George Hull, Amtrak CMO informed the Executive Board that he was appointing Dan Ruppert to serve as Vice Chair of the NGEC Executive Board and as Chair of the Technical subcommittee effective immediately following this meeting. Tim Ziethen, Amtrak, agreed to remain on for a new two-year term as Treasurer of the NGEC and as Vice Chair of the FASC.

Also prior to the Annual Meeting, the FRA named Mike Murray as its representative to the Executive Board and to the FASC and named Melissa Shurland as its representative to the Technical Subcommittee.

With no further discussion, this portion of the Annual Meeting was completed.

2024 NGEC Executive Board:

Chair – Ray Hessinger, NYSDOT
raymond.hessinger@dot.ny.gov – 518 457-8075

Vice Chair – Dan Ruppert, Amtrak (effective 2-3-24)
Rupperd@amtrak.com

Secretary – Amanda Martin, Iowa DOT
amanda.martin@iowadot.us

Treasurer - Tim Ziethen, Amtrak
Ziethet@amtrak.com - 302 661-6988 (W) 312 636-0539 (M)

Federal Railroad Administration:

Representative: Michael Murray
Michael.murray@dot.gov

States:

North Carolina Department of Transportation
Representative: Jason Orthner
jorthner@ncdot.gov

Washington Department of Transportation

Representative: Jason Biggs
Biggsjr@wsdot.wa.gov

Wisconsin Department of Transportation
Representative: Richard Kedzior
Richard.kedzior@dot.wi.gov

Missouri Department of Transportation
Representative: Troy Hughes
Troy.Hughes@modot.mo.gov

California Department of Transportation
Representative: Kyle Gradinger
kyle.gradinger@dot.ca.gov

Oregon Department of Transportation
Representative: Michael Jenkins
Michael.l.jenkins@odot.state.or.us

Maine Department of Transportation
Representative: Brian Beeler II, NNEPRA – designated by Maine DOT
brian@nnepra.com – c. 207 899-6089 p.207-780-1000 ext. 102

Illinois Department of Transportation
Representative: Melina Lopez
Melina.lopez@illinois.gov

The list of Executive Board members, and its officers, will posted on the NGEC website. A complete updated roster of NGEC members will also be posted to the website.

19.

2024 Look ahead – Ray Hessinger, Chair, NGEC:

Following the election of State Board members and officers, Chairman Hessinger gave the following closing remarks and a “look ahead” to 2024:

Before I give my closing remarks, and look ahead to 2024, I want to again acknowledge today's presenters.

Thank you for the time and effort you put into preparing your presentations and for joining us today, either in-person or virtually. It is your presentations that bring people here to DC for our annual meeting.

As we enter 2024, it seems like DeJaVu all over again. Like last year, we have less than one year of funding for the organization. Again, we will need to find a funding source to continue beyond the current fiscal year. The FRA encouraged Amtrak to resubmit the CRISI grant application when the next round of funding becomes available, and we certainly intend to do so.

Beyond that, our activities for 2024 will largely depend on whether Amtrak's CRISI application on behalf of the NGEC gets selected for funding.

If Amtrak's CRISI grant is not selected for funding, and no other source of funding is identified between now and September, the NGEC will spend 2024 wrapping up some ongoing tasks and winding down the organization.

We will finish the current update and publish the revised 305-901 Reference specification, which is working its way through the Technical Subcommittee.

We would expect the Working group on Weight to wrap up its efforts, but it is unlikely that there will be time and resources to incorporate any of its recommendations into our specifications.

Beyond that, we will review the budget after the annual meeting to see what resources we have left for the balance of the current funding period and see what tasks can be accomplished with the funds. Admittedly, it is a bleak outlook.

But on a more positive note, if CRISI funding is forthcoming it provides an opportunity to reinvigorate the organization, bring in new members and continue our support of the re-establishment of a domestic passenger rail car industry.

Amtrak will enter into a new grant agreement with the FRA on behalf of the NGEC and we will be required to put forth

a new scope of work, based on the content of the CRISI application.

This includes:

- *Renew agreements with AASHTO and support consultants.*
- *Continuing work to keep our existing specifications current.*
 - *Incorporate the recommendations from the Working Group on Weight*
 - *Continue the systematic update of each specification.*
- *Expanding our portfolio of specifications*
 - *Continue to work on aluminum carbody specifications.*
 - *Consider the need to expand the NGEC into the high speed and long-distance equipment arena.*

Other activities include increased public outreach to foster participation by segments of the industry that are underrepresented in the organization, including academia and labor.

It is an exciting opportunity to advance the NGEC into the future and is the one I hope to see come to pass.

With that, I will open the floor to any questions or comments.

20.

Other – all:

With no other business forthcoming, Chairman Ray Hessinger adjourned the 14th NGEC Annual Meeting at 12:32 pm Eastern.

Note:

At the 2024 NGEC Annual meeting there were many excellent and informative presentations given. Due to the number and size of the presentations, not all could be copied into the minutes – some were or were included partially. However, all presentations are posted on the NGEC website: www.ngec.org.

Members/non-members are encouraged to visit the website to see the presentations and to peruse the site to learn more about the NGEC – its activities and accomplishments.

Next – 15th Annual Meeting – February 2025

Next regular Executive Board - Teams Meeting 3-19-24.

Decisions/Action Items

2024 NGEC Backgrounder educational document:

The 2024 version of the two-page educational flyer is now available and was distributed in hard copy at the Annual Meeting.

You may view the educational document on the NGEC website at www.ngec.org

The Treasurer’s Report:

Treasurer Tim Ziethen provided a FASC update and the Annual Treasurer’s Report during the 2-2-24 NGEC Annual meeting. The report is inserted into these minutes and will be posted to the NGEC website.

Via consensus, the NGEC Board accepted the Treasurer’s report as presented.

NGEC Executive Board Elections:

On 2-2-24, all current members of the Executive Board were elected to new two- year terms – effective immediately and officers were also installed for two-year term:

Officers of the NGEC Executive Board:

Chair: Ray Hessinger, NYSDOT

Vice Chair: Dan Ruppert, Amtrak

Treasurer: Tim Ziethen, Amtrak

Secretary: Amanda Martin, Iowa DOT

A Look ahead – assuming the NGEC/Amtrak CRISI Grant is awarded so that the work of the NGEC can continue:

As we enter 2024, it seems like DeJaVu all over again. Like last year, we have less than one year of funding for the organization. Again, we will need to find a funding source to continue beyond the current fiscal year. The FRA encouraged Amtrak to resubmit the CRISI grant application when the next round of funding becomes available, and we certainly intend to do so.

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 - *Consider the need to expand the NGEC into the high speed and long-distance equipment arena.*

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It is an exciting opportunity to advance the NGEC into the future and is the one I hope to see come to pass.

With that, I will open the floor to any questions or comments.

Annual Meeting Presentations:

All presentations will be posted on the NGEC website at www.ngec.org in the Meetings Section.

Next regular Executive Board Webex meeting – 3-19-24

**Next Generation Equipment Committee (NGEC)
13th Annual Meeting (Hybrid)
February 2, 2024
8:00 am – 12:30 pm Eastern
Capitol Room- A/B
Hyatt Regency, Capitol Hill, Washington, DC
or**

8:00 - 8:25 am	Registration
8:25 – 8:30 am	Hotel Safety Briefing – Hotel Staff
8:30	Convene Annual Meeting - Ray Hessinger, NYSDOT and NGEC Chair
8:30- 8:40 am	Self introductions
8:40 – 8:45 am	Roll call voting members – establish quorum: Steve Hewitt, NGEC Program Manager
8:45 – 8:50 am	Review Meeting Agenda: Ray Hessinger Review Meeting Packets: Steve Hewitt
8:50 – 8:52 am	Approval of the Minutes from the January 23, 2023, Executive Board meeting – Ray Hessinger
8:52 – 9:05 am	Chairman’s Report – Ray Hessinger (V)
9:05 - 9:15 am	Update from Amtrak Government Affairs – Cody McClelland, Amtrak
9:15 - 9:40 am	Updates from the Federal Railroad Administration – Mike Murray
9:40 – 10:10 am	Treasurer’s Report & Finance & Administrative Subcommittee progress report - Tim Ziethen, Amtrak
10:10 am	Acceptance of the Treasurer’s Report – Ray Hessinger
10:10 - 10:30 am	Break
10:30 - 10:45 am	Technical Subcommittee Progress Report – Joe Paul, Amtrak, and Vice Chair Technical Subcommittee
10:45 - 10:55 am	Document Management Progress Report & look at the year ahead – Tammy Krause, Document Control Manager
10:55 – 11:05 am	Presentation: High Speed Wireless Study – Hamid Sharif-Kashani, University of Nebraska (V)
11:00 – 11:15 am	Presentation - Zero Emissions Multiple Units – Olivia Arant - Intro – Kyle Gradinger, Caltrans (V)
11:15 – 11:40 am	Update: Equipment Procurements f. Multi-State Single Level Venture Cars – Ryan Sharpe, Caltrans (V) g. Metro-North Dual Mode Locomotive Procurement – Joseph Reynolds, Metro-North Railroad (V) h. VIA Rail Equipment Procurements – Arnaud Lacaze and Jean-Philippe Quintal (V) i. Connecticut DOT Passenger Rail Car Procurement – Marci Petterson, CtDOT (V) j. Amtrak Fleet Procurements – Mike Welsh and Mike Kraft, Amtrak
11-40 am – 12:00 Noon	Charger Locomotive and Venture Car Experience e. Amtrak Experience –Mike Kraft, Joe Paul, Amtrak f. Mid-West States Experience – Melina Lopez, IDOT (V) g. California Experience –Ryan Sharpe, Caltrans (V) h. Washington State Experience – Jason Biggs, WSDOT

12:00pm – 12:05pm	Report from the Nomination Committee/Election of State Exec Board Members and Officers
12:05pm – 12:20 pm	2024 – A look Ahead – Goals and Priorities –NGEC Chair
12:20 pm – 12:30pm	Questions/Comments/Other Issues - All Attendees
12:30 pm	Closing Comments/Actions/Adjourn – Chair

List of Registered Attendees as of 2-1-24

In Person (* voting member)

48

*Tim Ziethen, Amtrak
*Dan Ruppert, Amtrak
*Mike Murray, FRA
*Troy Hughes, MODOT
*Jason Orthner, NCDOT
*Mike Jenkins, Oregon DOT
*Richard Kedzior, Wisconsin DOT
*Jason Biggs, WSDOT

Charlie King, FRA
Joe Paul, Amtrak
Michael Kraft, Amtrak
Michael Welsh, Amtrak
Blair Slaughter, Amtrak
Jennifer Bastian, Amtrak
Tara Soesbee, Amtrak
Cody McClelland, Amtrak
Melissa Shurland, FRA
Amanda Villani, WSDOT
Dave Warner, STV Inc. and "Mr. PowerPoint"
Steve Hewitt, NGEC
Larry Salci, Salci Consult
Shayne Gill, AASHTO
Strat Cavros, AASHTO
Barley Fields, AASHTO
Jon Dees, NCDOT
Tammy Krause, NGEC

Rodnee McGhee - Amsted Rail
Dick Bruss –
Steve Morrison – Siemens
James Michel
Kevin Myles – FRA
Tom LaMano – Cummins
Steve Ojalvo, Televic
Kirk Klug, Televic
Jack Martinson, Stadler Rail
Joe Kenas, Alstom
Allen Meek, Cummins
Ryan Edgecomb, Cummins
James Coston,
Richard Bowie, Alstom
Darrell Smith, Maryland Transit Administration
Tom Casartello, RPA
Mike Efaw, BRS
Christy Smith, BLET-IBT
Vince Verna, BLET-IBT
Jeff Joines, BMW-IBT
Jeremy Farr, BRS
Terry Soesbee, Railway Products Group

Virtual: (* voting member)

Virtual Attendees:

(46)

* voting member

*Ray Hessinger, NYSDOT
*Amanda Martin, Iowa DOT
*Brian Beeler II, Maine DOT
*Kyle Gradinger, Caltrans
*Melina Lopez, IDOT
Marci Petterson, CtDOT
Sarah Hernandez, Caltrans
Olivia Arant, Caltrans
Ryan Sharpe, Caltrans
Matt Hensley, MODOT
Art Peterson, for IDOT
Joe Di Liello, VIA Rail
Erika Santana, VIA Rail
Arnaud Lacaze, VIA Rail
Jean-Philippe Quintal, VIA Rail
Josh Coran, Talgo
Mehdrad Samani, Jacobs
Jack Madden, Erdman Amthony
Craig Mckeen, Progress Rail
Gary Wagner, Amsted Rail
Hamid Kashani, University of Nebraska
Martin Ritter, Stadler Rail
Paul Jamieson
Mario Bergeron
Patrick Centolanzi, FTA
John Batey, STV Inc.
Joseph Reynolds, Metro-North Railroad
Raymond Ginnell, Siemens
William Saddler, Raul V. Bravo + Associates
Edward Golitko, Corridor Rail Development
Ken Martin, Sharma and Associates
Yves Laperriere, Alstom
Fabio Cussigh, VDS Rail
David Wilcock, VHB
Bill Luebke, Kiel Americas
Stuart Trout, Consultant
Joe Moore. Smith Systems Inc.
Jeff Schultz, DEA Inc.
Walt Stringer, SBC Global
Armin Kick, Siemens
Frank Pascazio – Amsted Rail
James Michel
Dr. Franziska Lambrecht, Siemens
Malte Schierwater, Siemens
Steve Orzech, Freedman Seating
Martin Schroeder, Jacobs