SeedLink v4 proposal overview and status

Andres Heinloo, Chad Trabant,
Angelo Strollo, Jerry Carter
And the review team

History (FDSN WGIII in 2021 “Evolution of SeedLink”)

- Initial development and requirements at that time.
- The SeedLink protocol was originally created at GEOFON/GFZ around 2000.
- Version 3, the first widely used version of the protocol, was a result of the development within the MEREDIAN EC project under the lead of GEOFON/GFZ and ORFEUS/KNMI.
- Later, a number of extensions to SeedLink v3 were added by GFZ and IRIS DMC.

Motivation for next generation development

Known limitations of existing SeedLink protocol

- Only miniSEED 2.x with 512-byte record length supported
- Protocol (SELECT) assumes fixed length location and channel codes
- 24-bit sequence numbers limit ringbuffer to 8 GB
- Station wildcards, capabilities, extended ERROR reply not standardized
- End-time not supported with DATA and FETCH, time-windowed requests not resumable
- Sub-second time resolution not supported in protocol commands
- Authentication not supported

Features added to next generation protocol

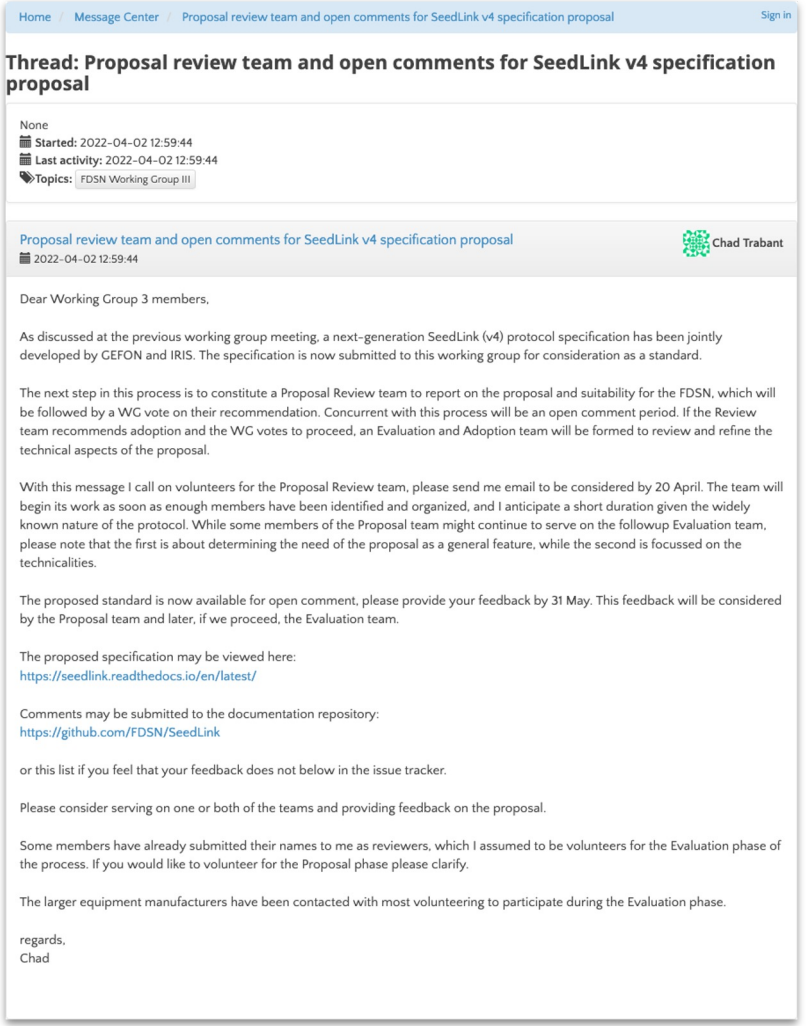
How limitations have been addressed

- New packet header allowing
  - Multiple payload formats (miniSEED 2, 3, etc.)
  - Variable length packets
- New SELECT syntax: delineated identifiers, wildcard “*” supported
- 64-bit sequence numbers
- Station wildcards, capabilities and error codes standardized
- New syntax of DATA and FETCH
  - including ISO8601-compatible date format with sub-second time resolution
- AUTH command added options for user/password and token
  - JWT being considered as authentication type

Current status

https://fdsn.org/message-center/thread/734/

02.04.2022 - Submitted to this working group for consideration as a standard.



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Thread: Proposal review team and open comments for SeedLink v4 specification proposal

None
Started: 2022-04-02 12:59:44
Last activity: 2022-04-02 12:59:44
Topics: FDSN Working Group III

Proposal review team and open comments for SeedLink v4 specification proposal
2022-04-02 12:59:44
Chad Trabant

Dear Working Group 3 members,

As discussed at the previous working group meeting, a next-generation SeedLink (v4) protocol specification has been jointly developed by GEFON and IRIS. The specification is now submitted to this working group for consideration as a standard.

The next step in this process is to constitute a Proposal Review team to report on the proposal and suitability for the FDSN, which will be followed by a WG vote on their recommendation. Concurrent with this process will be an open comment period. If the Review team recommends adoption and the WG votes to proceed, an Evaluation and Adoption team will be formed to review and refine the technical aspects of the proposal.

With this message I call on volunteers for the Proposal Review team, please send me email to be considered by 20 April. The team will begin its work as soon as enough members have been identified and organized, and I anticipate a short duration given the widely known nature of the protocol. While some members of the Proposal team might continue to serve on the followup Evaluation team, please note that the first is about determining the need of the proposal as a general feature, while the second is focussed on the technicalities.

The proposed standard is now available for open comment, please provide your feedback by 31 May. This feedback will be considered by the Proposal team and later, if we proceed, the Evaluation team.

The proposed specification may be viewed here:
https://seedlink.readthedocs.io/en/latest/

Comments may be submitted to the documentation repository:
https://github.com/FDSN/SeedLink

or this list if you feel that your feedback does not below in the issue tracker.

Please consider serving on one or both of the teams and providing feedback on the proposal.

Some members have already submitted their names to me as reviewers, which I assumed to be volunteers for the Evaluation phase of the process. If you would like to volunteer for the Proposal phase please clarify.

The larger equipment manufacturers have been contacted with most volunteering to participate during the Evaluation phase.

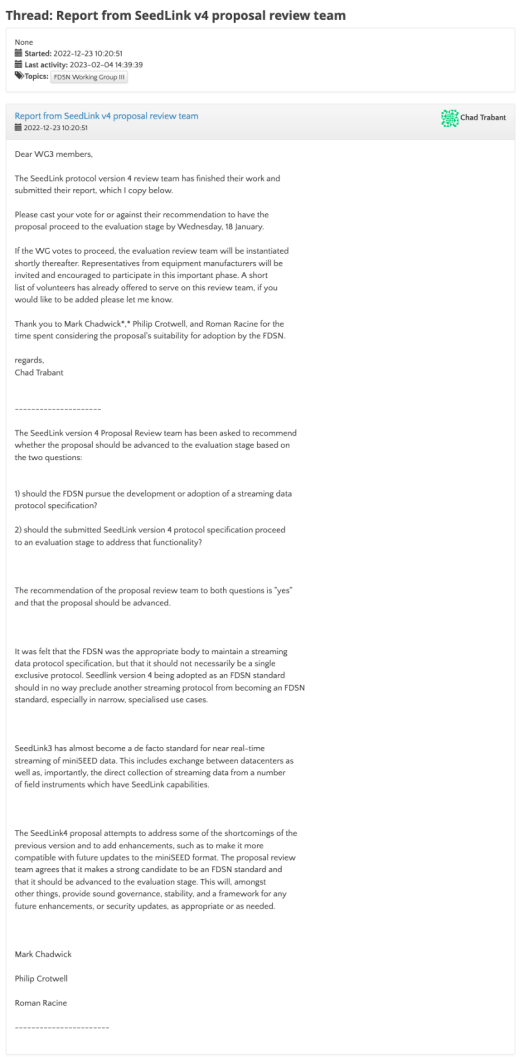
regards,
Chad

Current status

https://fdsn.org/message-center/thread/818/

23.12.2022 - A review team considered the proposal's suitability for adoption by the FDSN (Mark Chadwick, Philip Crotwell, Roman Racine):

“*a strong candidate to be an FDSN standard and that it should be advanced to the evaluation stage. This will, amongst other things, provide sound governance, stability, and a framework for any future enhancements, or security updates, as appropriate or as needed.*”



Thread: Report from SeedLink v4 proposal review team

None
Started: 2022-12-23 10:20:51
Last activity: 2023-02-04 14:39:39
Topics: FDSN Working Group III

Report from SeedLink v4 proposal review team — Chad Trabant
2022-12-23 10:20:51

Dear WG3 members,

The SeedLink protocol version 4 review team has finished their work and submitted their report, which I copy below.

Please cast your vote for or against their recommendation to have the proposal proceed to the evaluation stage by Wednesday, 18 January.

If the WG votes to proceed, the evaluation review team will be instantiated shortly thereafter. Representatives from equipment manufacturers will be invited and encouraged to participate in this important phase. A short list of volunteers has already offered to serve on this review team, if you would like to be added please let me know.

Thank you to Mark Chadwick*,* Philip Crotwell, and Roman Racine for the time spent considering the proposal's suitability for adoption by the FDSN.

regards,
Chad Trabant

The SeedLink version 4 Proposal Review team has been asked to recommend whether the proposal should be advanced to the evaluation stage based on the two questions:

1) should the FDSN pursue the development or adoption of a streaming data protocol specification?

2) should the submitted SeedLink version 4 protocol specification proceed to an evaluation stage to address that functionality?

The recommendation of the proposal review team to both questions is "yes" and that the proposal should be advanced.

It was felt that the FDSN was the appropriate body to maintain a streaming data protocol specification, but that it should not necessarily be a single exclusive protocol. Seedlink version 4 being adopted as an FDSN standard should in no way preclude another streaming protocol from becoming an FDSN standard, especially in narrow, specialised use cases.

SeedLink3 has almost become a de facto standard for near real-time streaming of miniSEED data. This includes exchange between datacenters as well as, importantly, the direct collection of streaming data from a number of field instruments which have SeedLink capabilities.

The SeedLink4 proposal attempts to address some of the shortcomings of the previous version and to add enhancements, such as to make it more compatible with future updates to the miniSEED format. The proposal review team agrees that it makes a strong candidate to be an FDSN standard and that it should be advanced to the evaluation stage. This will, amongst other things, provide sound governance, stability, and a framework for any future enhancements, or security updates, as appropriate or as needed.

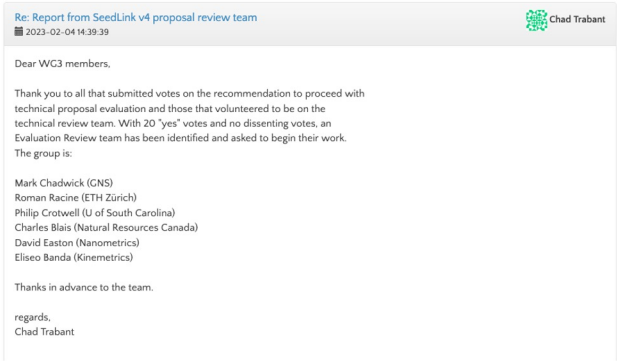
Mark Chadwick

Philip Crotwell

Roman Racine

Current status

https://fdsn.org/message-center/thread/818/



Re: Report from SeedLink v4 proposal review team

2023-02-04 14:39:39

Chad Trabant

Dear WG3 members,

Thank you to all that submitted votes on the recommendation to proceed with technical proposal evaluation and those that volunteered to be on the technical review team. With 20 "yes" votes and no dissenting votes, an Evaluation Review team has been identified and asked to begin their work. The group is:

Mark Chadwick (GNS)
Roman Racine (ETH Zürich)
Philip Crotwell (U of South Carolina)
Charles Blais (Natural Resources Canada)
David Easton (Nanometrics)
Eliseo Banda (Kinemetrics)

Thanks in advance to the team.

regards,
Chad Trabant

04.02.2023 - with 20 votes, WGII members agreed

to move forward with the actual technical proposal evaluation.

Review team:

Mark Chadwick (GNS), Roman Racine (ETH Zürich), Philip Crotwell (U of South Carolina), Charles Blais (Natural Resources Canada), David Easton (Nanometrics), Eliseo Banda (Kinemetrics)

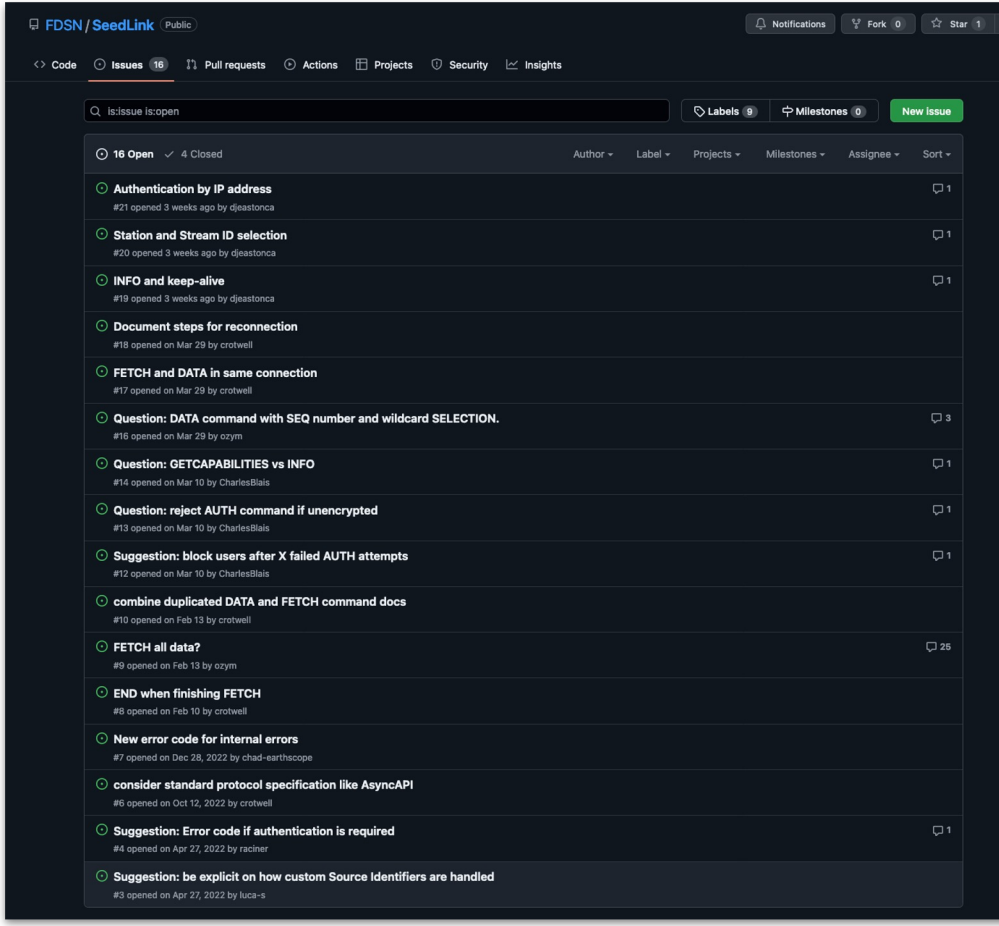
Current status

Under review

https://github.com/FDSN/SeedLink/issues

Today - open issues from the review team being addressed by the developer group

- Posting answers to the issues, closing them where possible
- Where changes to the specs are needed suggesting them in the issues already



Outlook (assuming acceptance after review)

- Conclusion of review process with review report (expected by August)
- Include modifications requested/agreed with reviewers and review of specifications (October)
- WGIII votes on final adoption (November)
- Public release of the project repository and specifications (December/January)
- Prototype server from GEOFON (Spring 2024)
- Prototype libslink and slinktool client from IRIS DMC (Spring 2024)