STRATUM V2
PROJECT DEVELOPMENT PROPOSAL 2022
DRAFT 11/11/2021

Definitions

- STRATUM V2 means the stratum v2 protocol as defined here

- MINING PROTOCOL, JOB NEGOTIATION PROTOCOL, TEMPLATE DISTRIBUTION PROTOCOL, JOB DISTRIBUTION PROTOCOL means the (sub)protocol as defined by STRATUM V2

- MINING DEVICE, POOL SERVICE, MINING PROXY, JOB NEGOTIATOR, TEMPLATE PROVIDER means the roles defined by STRATUM V2

1. Introduction

The 2021 project plan was written assuming a team of 2/3 people. Unfortunately, this condition was not met for several months. That is why I decided to review and update some project plan goals trying to maintain the original as much as possible.

Now a 3 person team is available and committed. Having been almost one year since the drafting of the 2021 project plan, I thought that now is the best time to create a new project plan shared by all the team members.

The 2021 project plan's goals were basically three:
1) Implementation of 3 (sub)protocols MINING PROTOCOL, JOB NEGOTIATION PROTOCOL, TEMPLATE DISTRIBUTION PROTOCOL
2) implementation of 4 roles POOL SERVICE, MINING PROXY, JOB NEGOTIATOR, TEMPLATE PROVIDER.
3) export of the (sub)protocols needed by the TEMPLATE PROVIDER as a C static library.

To date the status of the plan is as follows. The first goal has been fully achieved. All of the 3 (sub)protocols have been completely implemented. The second goal has been partially achieved (MINING PROXY partially implemented, and implementation of the TEMPLATE PROVIDER started). The third goal was fully achieved (the C static library implemented).

2. Proposal

The main goals of the new 2022 project plan are the following:

1) **finalization** of what has been proposed in the 2021 project plan,
2) **stabilization** of the work done,
3) extensive **documentation** of everything that has been done.

Finalization and Stabilization Goals

Firstly, the PROXY and the TEMPLATE PROVIDER will be finalized to test the entire code in a real environment (alpha trial). This means that once the PROXY and the TEMPLATE PROVIDER are ready, all the code written will be extensively tested (unit, integration, and usability tests) and an alpha trial will be executed.

Finally, once all the written software is production-ready, a POOL SERVICE and a v1 <-> v2 PROXY will be realized.

Documentation Goal

For a broad adoption of Sv2, it's essential to issue high-quality documentation. The documentation will be composed by (1) code documentation, needed by developer wishing to improve Sv2, (2) examples and tutorials, needed for operators who need to deploy Sv2 compatible proxies or pools, (3) benchmarks, needed for operators to have more confidence in the Sv2 advantages over Sv1.

WBS and Milestones

Project Macro Tasks and Milestones are listed in [ANNEX1], including the percentage of completion of each of the three main goals of the project at each milestone achievement.

3. Future Developments

It should be stressed that some important tasks cannot be addressed during this one-year, 3-people project plan. In particular, two important tasks are not included in this project plan:

1. MINING DEVICE (firmware for the miners)
2. Finalization of the Sv2 spec (JOB DISTRIBUTION PROTOCOL)

4. Execution

Finalization Goal

The execution is quite similar to that drafted for the 2021 project plan with some changes.

Unchanged part

To simplify the adoption by the operators. Both the POOL SERVICE and the MINING PROXY implementations will be very easy to deploy. Through GitHub's actions, each release will be made available as docker images and as a binary. A good quantity of examples will be provided. Every example will be composed of a detailed readme and a docker-compose file containing all the software needed (the pool service or the proxy or both and Bitcoin). Between the examples, there will also be one for solo miners. Two tutorials will be written.

The TEMPLATE PROVIDER will be realized in Bitcoin Core and buildable with Guix as stated in the 2021 project plan

Changed part

The use case supported by the POOL SERVICE and the MINING PROXY will be a subset of the ones proposed in the project plan of 2021 that because maturing more knowledge of the Sv2 protocol in this last year I realized that some of them are not correct and other are redundant. The MINING PROXY and the POOL SERVICE will act also as a JOB NEGOTIATOR, that point was not explicitly made in the 2021 project plan but it was implicitly assumed.

Stabilization Goal

Stabilization is composed of 3 macro tasks: (1) tests, (2) usability and (3) trials.

The already implemented test architecture composed of unit tests, prop tests, and integration tests (done as examples) will be expanded to have good code coverage; a method to measure code coverage needs to be added.

In order to improve usability all the crates' errors need to be refactored; this will be done more effectively when at least 2 roles are implemented. The sv2-ffi crate needs to be wrapped in an idiomatic C++ layer. The messages-sv2 crate needs to be refactored (or just export an interface that wraps the one that we have now) as some operations that are very common are not really easy to do with the current interface.

Five different configurations for testing the code are listed in [ANNEX 2]. Each configuration has been designed to conduct the appropriate tests as the code is developed and new project milestones are reached. Some third-party software will be used to perform the test (miner firmwares, and the pool service at least until July).

Documentation Goal

All the exported interfaces of the library crates will be documented using rustdoc. Examples of how to set up the most common configuration of Sv2 proxies and pools will be provided with some articles that explain what is in the example and why it should be used.

Annex 1
Milestones Planning

Macro Task	Milestone	Finalization (completion%)	Stabilization (completion%)	Documentation (completion%)
Proxy and TP Ready to be tested	15/01/2022	80%	0%	0%
Protocols/v2/messages-sv2 refactored. Alpha trial started	15/02/2022	85%	30%	0%
All written code is extensively tested. Error in low level and high-level crates are refactored	15/04/2022	90%	90%	0%
Pool service and V1 <-> V2 proxy realized	15/07/2022	100%	90%	0%
Pool service and V1 <-> V2 proxy tested	15/08/2022	100%	100%	0%
Everything is extensively documented	01/01/2023	100%	100%	100%

Configuration 1

Projected Completion Date
- Feb 2022

Summary
- SV2 Mining Devices connect to the Proxy via a standard channel.
- The Proxy connects to the Pool Service via a standard channel.
- The Pool Service performs transaction set selection.
- This configuration should only be used until group channels are supported by the Pool Service. In the meantime, this configuration will be used during the trial period.

Pool Requirements
- Sv2 compatible pool
- Supports standard channels

Miner Requirements
- Sv2 compatible firmware installed on each Mining Device
- stratum-proxy server

Diagram

```
                 standard              standard
+--------+       channel    +-------+  channel    +--------------+
| MD 0   | <-------->  |          | <-------->  |              |
| MD 1   | <-------->  |          | <-------->  |              |
| ...    |             | Proxy |                | Pool Service |
| MD n-1 | <-------->  |          | <-------->  |              |
| MD n   | <-------->  |          | <-------->  |              |
+--------+             +-------+                +--------------+
  (sv2 fw)
```

Configuration 2

Projected Completion Date
- Feb 2022 - but is dependent on Pool Service support of the Job Negotiator, which may not be until July 2022

Summary
- SV2 Mining Devices connect to the Proxy via a standard channel.
- The Proxy connects to the Pool Service via a standard channel.
- The Mining Farm performs transaction set selection.
- This configuration should only be used until group channels are supported by the Pool Service. In the meantime, this configuration will be used during the trial period.
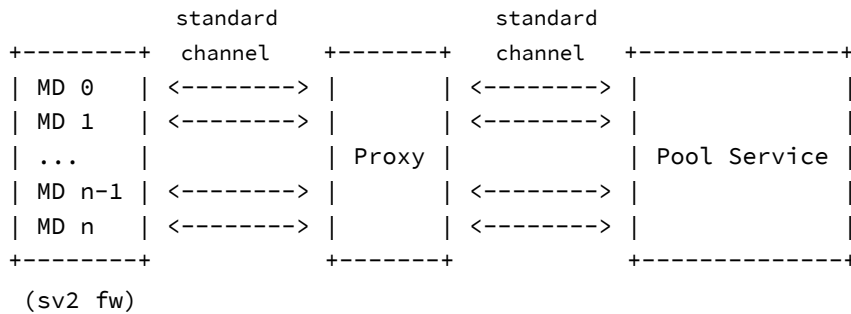
Pool Requirements
- Sv2 compatible pool
- Supports standard channels
- Supports Job Negotiator protocol

Miner Requirements
- Sv2 compatible firmware installed on each Mining Device
- stratum-proxy server with Template Provider and Job Negotiator protocol support

Diagram

```
                  standard              standard
+--------+        channel    +-------+  channel    +--------------+
| MD 0   | <--------> |      |       | <--------> |              |
| MD 1   | <--------> |      |       | <--------> |              |
| ...    |            | Proxy |                   | Pool Service |
| MD n-1 | <--------> |      |       | <--------> |              |
| MD n   | <--------> |      |       | <--------> |              |
+--------+            +-------+                   +--------------+
 (sv2 fw)            (TP + JN)                        (JN)
```
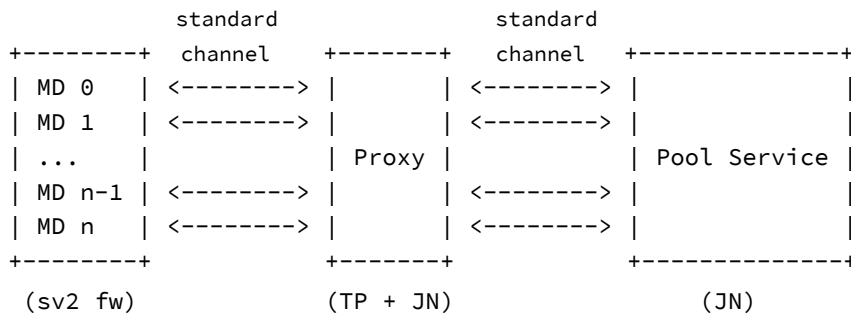
Configuration 3

Projected Completion Date

- Feb 2022 - but is dependent on Pool Service support for group channels, which may not be until July 2022

Summary

- SV2 Mining Devices connect to the Proxy via a standard channel.
- The Proxy connects to the Pool Service via a group channel.
- The Pool Service performs transaction set selection.
- This configuration should always be used over configurations using standard channels between the Proxy and the Pool Service.

Pool Requirements

- Sv2 compatible pool
- Supports group channels

Miner Requirements

- Sv2 compatible firmware installed on each Mining Device
- stratum-proxy server

Diagram

```
                 standard              group
+--------+       channel    +-------+  channel    +--------------+
| MD 0   | <--------> |            |             |              |
| MD 1   | <--------> |            |             |              |
| ...    |            | Proxy | <-------> | Pool Service |
| MD n-1 | <--------> |            |             |              |
| MD n   | <--------> |            |             |              |
+--------+            +-------+              +--------------+

  (sv2 fw)
```

Configuration 4

Projected Completion Date

- Feb 2022 - but is dependent on Pool Service support for group channels and the Job Negotiator, which may not be until July 2022

Summary

- SV2 Mining Devices connect to the Proxy via a standard channel.
- The Proxy connects to the Pool Service via a group channel.
- The Mining Farm performs transaction set selection.
- This configuration should always be used over configurations using standard channels between the Proxy and the Pool Service.
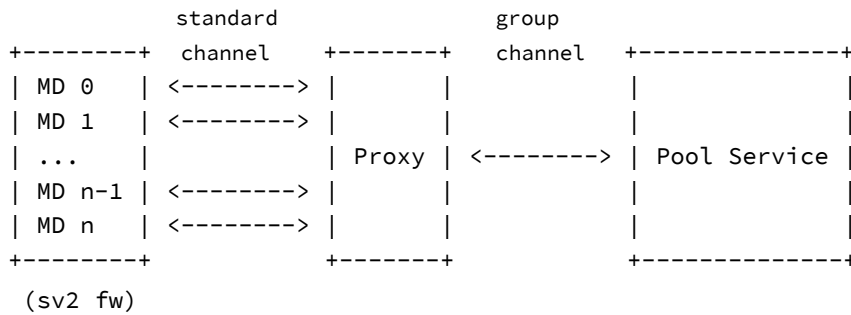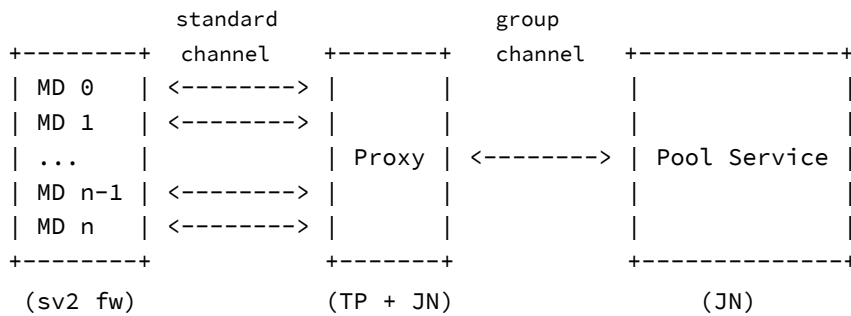
Pool Requirements

- Sv2 compatible pool
- Supports group channels
- Supports Job Negotiator protocol

Miner Requirements

- Sv2 compatible firmware installed on each Mining Device
- stratum-proxy server with Template Provider and Job Negotiator protocol support

Diagram

```
                 standard              group
+--------+       channel    +-------+  channel   +--------------+
| MD 0   | <--------> |           |            |              |
| MD 1   | <--------> |           |            |              |
| ...    |            | Proxy | <-------->  | Pool Service |
| MD n-1 | <--------> |           |            |              |
| MD n   | <--------> |           |            |              |
+--------+            +-------+              +--------------+
 (sv2 fw)              (TP + JN)                  (JN)
```

Configuration 5
Projected Completion Date
- July 2022

Summary
- SV1 Mining Devices connect to the Proxy via a sv1 connection.
- The Proxy connects to the Pool Service via an extended channel.
- The Pool Service performs transaction set selection.
- This configuration is a translation between Mining Devices running sv1 compatible firmware and the Proxy. It requires the least amount of effort from a mining farm because the mining device firmware is sv1, so no firmware changes are required here. For this reason, it may be tempting for a miner to use the Proxy in this way, however this configuration is the least efficient way to mine. It is always recommended to use sv2 firmware with group channels between the Proxy and the Pool Service (see Configurations 1 and 2 above).
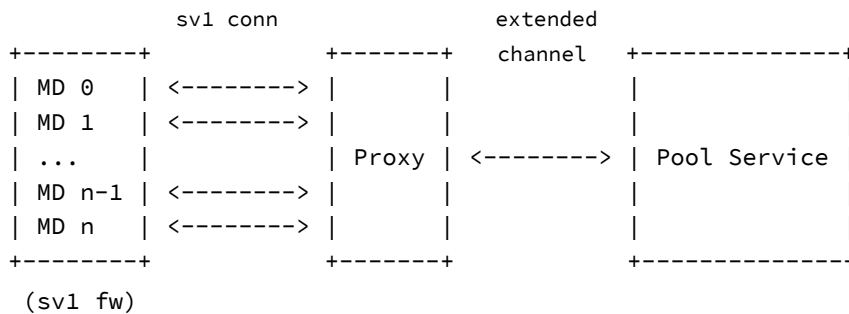
Pool Requirements
- Sv2 compatible pool
- Supports extended channels

Miner Requirements
- Sv1 compatible firmware installed on each Mining Device
- stratum-proxy server

Diagram

```
            sv1 conn              extended
+--------+              +-------+  channel   +--------------+
| MD 0   | <--------> |       |            |              |
| MD 1   | <--------> |       |            |              |
| ...    |            | Proxy | <--------> | Pool Service |
| MD n-1 | <--------> |       |            |              |
| MD n   | <--------> |       |            |              |
+--------+              +-------+            +--------------+

  (sv1 fw)
```

Configuration 6

Projected Completion Date
- July 2022

Summary
- SV1 Mining Devices connect to the Proxy via a sv1 connection.
- The Proxy connects to the Pool Service via an extended channel.
- The Mining Farm performs transaction set selection.
- This configuration is a translation between Mining Devices running sv1 compatible firmware and the Proxy. It requires the least amount of effort from a mining farm because the mining device firmware is sv1, so no firmware changes are required here. For this reason, it may be tempting for a miner to use the Proxy in this way, however this configuration is the least efficient way to mine. It is always recommended to use sv2 firmware with group channels between the Proxy and the Pool Service (see Configurations 1 and 2 above).

Pool Requirements
- Sv2 compatible pool
- Supports extended channels
- Supports Job Negotiator protocol

Miner Requirements
- Stratum V2 compatible firmware installed on each Mining Device
- stratum-proxy server with Template Provider and Job Negotiator protocol support

Diagram

```
             sv1 conn              extended
+--------+                +-------+ channel  +--------------+
| MD 0   | <--------> |       |          |              |
| MD 1   | <--------> |       |          |              |
| ...    |            | Proxy | <-------> | Pool Service |
| MD n-1 | <--------> |       |          |              |
| MD n   | <--------> |       |          |              |
+--------+                +-------+          +--------------+
 (sv1 fw)             (TP + JN)               (JN)
```