FDSN WG-V: Seismic Station State-of-Health Reporting

Date: February 15, 2016
Version: 0.1

1. **Time series and/or sampled SOH channels**
   Where appropriate we'd expect these channels to be stored as mseed time series data

   1.1. Total system
      1.1.1. system input voltage
      1.1.2. system current
   1.2. Sensor system
      1.2.1. voltage
      1.2.2. current
      1.2.3. mass positions
      1.2.4. temperature
      1.2.5. Sensor tilt
   1.3. Digitizer system
      1.3.1. voltage
      1.3.2. internal battery voltage
      1.3.3. current
      1.3.4. temperature
      1.3.5. humidity
      1.3.6. pressure
      1.3.7. Resets
      1.3.8. Reboots
      1.3.9. data buffer used
      1.3.10. data buffer capacity
      1.3.11. memory used
      1.3.12. memory capacity
      1.3.13. CPU load average
      1.3.14. media write
   1.4. Storage
      1.4.1. used bytes
      1.4.2. available bytes
      1.4.3. capacity bytes
   1.5. Telemetry
      1.5.1. link status
      1.5.2. input - cumulative bytes over time window
      1.5.3. output - cumulative bytes over time window
      1.5.4. buffer used
      1.5.5. buffer capacity
      1.5.6. packets dropped or tossed by digitizer
   1.6. Timing
      1.6.1. Clock phase error

1.6.2. GPS lock status
1.6.3. GPS antenna current
1.6.4. GPS time
1.6.5. GPS position
1.6.6. GPS module current
1.6.7. GPS module voltage
1.6.8. VCO voltage

2. Log File (non-time series, e.g. on power-up or on request)
Stored as mseed log channels. All entries time stamped.

2.1. DAS configuration and configuration updates (e.g. sample rate(s), sensor centering threshold values, gain settings, telemetry, etc.)
2.2. Hardware
2.2.1. DAS serial number
2.2.2. DAS components HW version
2.2.3. DAS components FW version
2.2.4. DAS component serial #
2.2.5. DAS nominal bit weight
2.2.6. sensor serial number
2.2.7. sensor manufacturer & model
2.2.8. sensor FW
2.2.9. sensor nominal sensitivity
2.2.10. GPS serial number
2.2.11. GPS FW version
2.2.12. GPS model/HW version
2.2.13. media serial number
2.2.14. media HW
2.2.15. media FW
2.2.16. VCO nominal drift rate
2.3. SOH Information
2.3.1. All Errors, warnings, state changes. (see Section 4. Examples below)
2.3.2. sensor orientation
2.3.3. GPS # satellites tracked and constellation used
2.3.4. digitizer system clock resyncs time and value
2.3.5. media present, not present, formatted
2.3.6. sensor control line activity

***3.* Meta-Data**
Should be available in stationXML. In addition to information available from SOH described above:

3.1. DAS response (self-aware)
3.2. Sensor response (self-aware)
3.3. Response changes

3.4. SNCL w/ intelligent channel naming if sensor-aware

4. **Example error/warnings for log file**
   4.1. Total system
      4.1.1. System input voltage below programmed threshold
      4.1.2. Power lost: Low-voltage disconnect (LVD)
      4.1.3. Whenever an operational limit is close, such as low/high temp or low/high voltage, buffer full, etc. i.e. anything that will cause the unit to stop acquiring data.
      4.1.4. If unit erases or can't find user configuration, or reverts to a default configuration.
      4.1.5. Power ups.
   4.2. Sensor system
      4.2.1. Mass re-center with flag for cause
         4.2.1.1. Automatic – triggered by mass reaching a threshold
         4.2.1.2. Programmed – scheduled mass re-center
         4.2.1.3. Manual – user requested
   4.3. Digitizer system
      4.3.1. Acquisition started/stopped
      4.3.2. Acquisition disabled due to full RAM/buffer
      4.3.3. self calibration offset and gain per channel
   4.4. Storage
      4.4.1. Write to media failed (with reasons: low power, failed to create file system, media services being suspended on low voltage, etc.)
      4.4.2. Media full (warnings at certain thresholds, 80% full, 90%, etc.)
   4.5. Telemetry
      4.5.1. Link status change
   4.6. Timing
      4.6.1. GPS when NMEA string absent
      4.6.2. GPS when 1PPS absent
      4.6.3. When drift corrections are absent
      4.6.4. GPS and OSC differ by >= +/- 1sec