Scannex rt.buffer Overview

Operation

The Scannex rt.buffer is a rugged, low power 3G (UMTS/HSPA+) remote telemetry unit providing a flexible solution in marine and harsh environmental conditions, with a powerful range of scripted collection, delivery and management options.

Operating Modes

For battery operation, the rt.buffer stays in ultra low-power (40µA at 7.2V) sleep mode and wakes up on a variety of triggers or internal timers to collect data from external sensors. It will periodically deliver the data over the 3G network.

Data Collection Options

- Serial: 300 to 115200 baud
- Digital: 2x digital/pulse-count inputs
- Analog: 24-bit differential input

Data Delivery Options

The rt.buffer can deliver to an IoT/Cloud server or directly to private servers in a fully transactional manner over 3G with optional zlib compression by:

- FTP Push
- FTP+TLS Push

Management

Configuration and administration of the rt.buffer can be done locally or remotely:

- Locally by a USB connection (uses custom USB-HID protocol that requires zero driver installation on Windows)
- Remotely when the rt.buffer makes a 3G connection to the server.
  The rt.buffer can query the server to request whether updates are required (e.g. firmware, configurations) as well as diagnostic data and logs

Storage

- 128MB of non-volatile flash memory

Data Transmission

- 3G (UMTS/HSPA+) global modem -PTCRB, GCF, ICASA, RCM approved
  UMTS: 800/850/900/1900/2100MHz
- GPRS & EDGE also supported
  GSM: 850/900/1800/1900MHz

Lua Scripting

The Lua scripting engine is extremely flexible and can control the full operation of the device. Several Lua Apps can be preloaded onto the flash-filesystem, and invoked by local or remote configuration.

The Lua libraries include functions to perform:

- Data collection protocols and formats for connected devices
  - Binary device protocols with data exchanges
  - Handling ASCII CSV or TSV formats
  - Checksum verification
  - ModBus RTU over RS232 or RS485
  - NMEA format verification and NMEA format generation
- Process incoming data, e.g:
  - Selectively choose what data to store
  - Perform calculations on incoming data
  - Split data into multiple files
  - Convert from binary to ASCII
  - Look for and analyse alarm conditions
- Communicate to connected device(s)
  - Scheduled or automatic programming changes
  - Upgrading device firmware is possible
- Storage to flash-based files in many formats, e.g.
  - Binary, ASCII, CSV, TSV data formats
  - Generation of data file headers
  - File naming based on any details (e.g. date/time/serial number etc)
  - Checksum (CRC-8/16/32 any polynomial) and hash values (SHA-256/SHA-1/MD-5 etc)
- Data delivery over 3G to IoT server:
  - Duplicating data for redunancy
  - Delivery to multiple servers
- Remote management and firmware, configuration & scripting updates
  - e.g. Lua functions can be invoked by the IoT server

Sample Lua Apps are available from Scannex for:

- ASCII lines or Binary serial collection
- NMEA data
- Pulse + ADC sampling

Hardware

The rt.buffer uses a single-chip ARM Cortex-M4 processor which can run in ultra low-power sleep mode for extended battery life. It wakes from internal timer events or external triggers. Key functions:

- 128Mbyte high reliability flash storage
- RTC - updated through the terminal or over the Internet from NTP server
- 3G (HSPA+) global modem (mini PCI Express plug-in module) -PTCRB approved
  - SIM card fitted on the PCB
  - GPRS & EDGE also supported
- 1 x Serial data collection port, non-isolated: 300-115200 baud with flow control
  - Optional in-line RS485 module
  - ModBus RTU support in Lua
- 1 x high impedance ADC channel
  - 3V reference output
  - 24-bit resolution
  - Single-ended: 0V → 1.5V
  - Differential: ± 1.5V
- 2 x digital pulse inputs (max 64 Hz)
  - Can be used for pulse-counting and event changes
- Management port
  - USB: driverless USB-HID interface to Scannex Windows software
  - Serial port (non-isolated): 300-115200 baud with flow control
- Magnetic Switch
  - For instant local activation when in sleep mode
- LED status indicator

Power Supply

The rt.buffer can run from internal primary battery pack(s) and/or external DC supply and will automatically power from whichever is the highest voltage. The options are:

Internal primary (non-rechargeable) batteries:

a) 1 x lithium battery pack (2 x LS20): 3-5 years battery life

b) 2 x lithium battery packs in parallel 6-10 years battery life

c) Four 4 x alkaline LR20-cells (long life) 1 year battery life

- Above battery life figures assume:
  - Sampling every 30 secs for 1 sec, and transmitting once per day for approx 60 secs (*note: dependent on network, and data volumes)*
  - Ambient temperature 20ºC
  - The rt.buffer is not providing power to external devices

External Power: 9-28VDC (not internally isolated)

Power to the Device: Can supply 3.6V to the connected device, under Lua script control.

Battery Pack (Saft 2S1P LSH20)

- 2 x 3.6V primary LSH20 lithium-thionyl chloride D-size spiral cells, connected in series at 7.2V nominal voltage.
- Integral protection diode and thermal fuse

Construction

Custom die-cast aluminium case with integral carry handle and connector protector

- IP68 to 2 metres for 72 hours
- Single compartment

Approvals

- FCC 47 CFR Part 15A
- ICES 003 Class A
- RoHS
- In process:
  - CE Class A (EN55022, EN55024)
  - EU export approval
  - US export approval

Connector Pin-Outs

Device

Mating Connector PX0410/08P or PX0400/08P

Bulgin PX0412/08S	rt.buffer Function
1	RS232: RxD input
2	RS232: CTS input
3	RS232: TxD output
4	RS232: RTS output
5	Digital Pulse Input 1
6	Digital Pulse Input 2
7	3.6V Power Output (to connected device)
8	Ground

Pressure

Mating Connector PX0410/06P or PX0400/06P

Bulgin PX0412/06S	rt.buffer Function
1	Analog Input +ve
2	Analog Input -ve
3	Reference Output (3.00V)
4	Ground
5	Screen
6	n/c

Power

Mating Connector PX0410/04S or PX0400/04S

Bulgin PX0412/04P	rt.buffer Function
1	0V
2	9-28VDC Supply (not isolated)
3	n/c
4	n/c

Engineer

Mating Connector PX0410/08S or PX0400/08S

Bulgin PX0412/08P	rt.buffer Function
1	RS232: TxD output
2	RS232: RTS output
3	RS232: RxD input
4	RS232: CTS input
5	USB Device: Data-
6	USB Device: Data+
7	USB Device: Power
8	Ground

Antenna

Bulgin: PX0414	Mating Connector PX0416