SwiftForth SNMP Agent

Adding an SNMP agent to the RL8200 Antenna Controller SwiftForth Application

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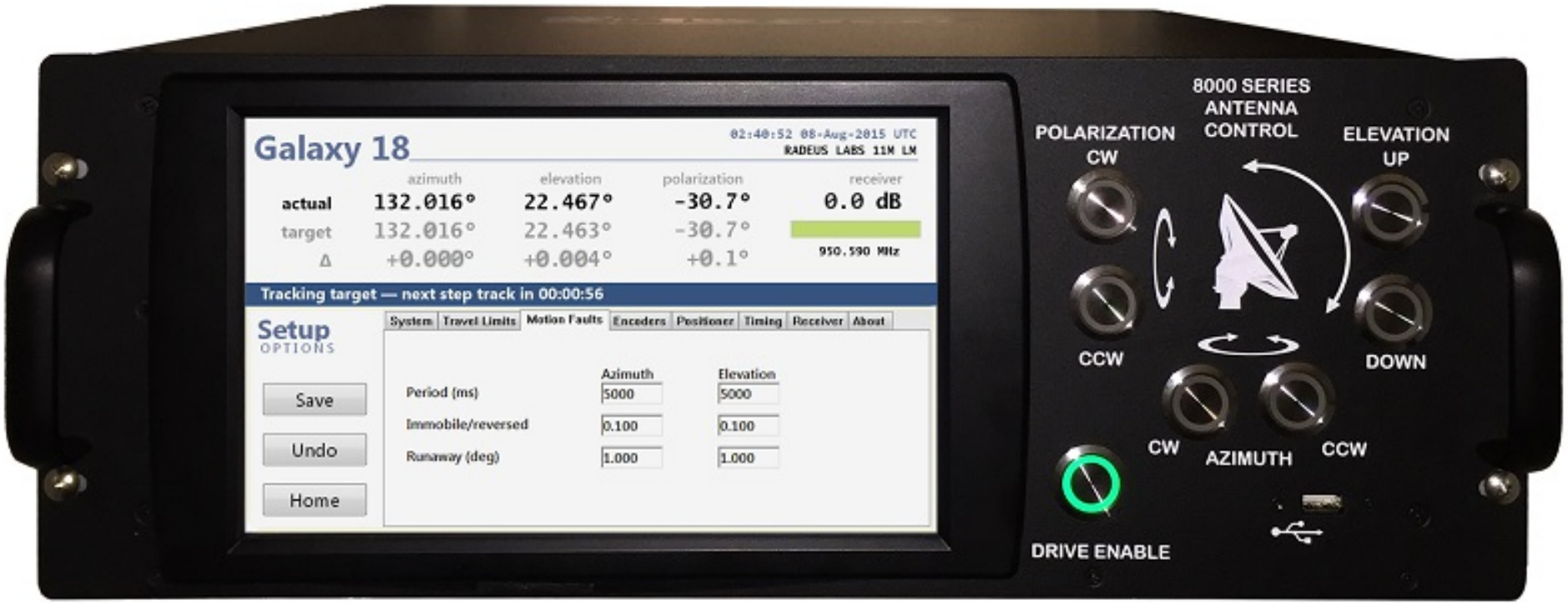
7200 Antenna Controller

RL8200 Antenna Controller



ACU Touch-Panel Computer

- Windows 7 Embedded
  - Touch-screen GUI
  - TCP/IP networking (2 ports)
  - USB peripherals (4 ports)
  - Legacy serial peripherals (2 ports)
- SwiftForth
  - Multiple threads for communication and control
  - Object-oriented GUI using SWOOP
  - Simple Win32 API integration

TPC Software

- Configuration
  - Settings (global, site, antenna, motors, transducers)
  - Targets (satellites, tracking modes, parameters)
- Control
  - Automatic control (follow targets)
  - Manual control (front-panel jog buttons)
- Status
  - Current position, tracking, signal
  - Fault display
  - Alarm (audible, digital output)

Testing on 11m C-Band Antenna

SNMP

Simple Network Management Protocol

Internet-standard protocol for collecting and organizing information about managed devices on IP networks and for modifying that information to configure and control those devices.

There are three significant versions of SNMP. SNMPv1 is the original version of the protocol. SNMPv2c and SNMPv3 feature improvements in performance, flexibility and security.

SNMP Client/Server Model

- SNMP Manager (Client)

  One or more administrative computers, called *managers*, have the task of monitoring or managing devices on a network.

- SNMP Agent (Server)

  Each managed system runs a software component called an *agent*, which reports information via SNMP to the manager.

TLA List

- UDP – User Datagram Protocol

  Connectionless internet protocol, defined in RFC 768.
- MIB – Management Information Base

  Database used for managing the entities in a communication network.
- OID – Object ID

  Pointer to network object stored in the database.
- PDU – Protocol Data Unit

  Data packet whose format depends on the protocol version and the PDU type.

WinSNMP API

Windows SNMP Application Programming Interface version 2.0 allows you to develop SNMP-based network applications (manager and agent) that execute in the Windows environment.

- Standard component since Windows 2000
- Complete interface documented on MSDN
- API functions exported by Wsnmp32.dll
- Supports SNMP V1 and V2c

Dynamic Libraries

Writing Windows, Linux, or macOS programs requires access to functions supplied by dynamic libraries.

- DLL (Windows – Dynamic Link Library)
  user32.dll, kernel32.dll
- SO (Linux – Shared Library)
  libc.so.6
- DYLIB (macOS – Dynamic Library)
  libc.dylib

SwiftForth Library Interface

1. Open the library

```
LIBRARY Wsnmp32.dll
```

2. Import functions from the library

```
FUNCTION: SnmpSetPort ( hEntity nPort -- status )
```

From MSDN documentation

```
SNMPAPI_STATUS SnmpSetPort(
  _In_ HSNMP_ENTITY hEntity,
  _In_ UINT nPort
);
```

SNMP Agent Implementation

- Initialization
  - SnmpStartup – Initializes WinSNMP
  - SnmpCreateSession – Establishes callback address
  - SnmpStrToEntity – Establishes app entity
  - SnmpSetPort – Sets the entity port number
  - SnmpListen – Defines the entity as an *agent*
- Operation in callback
  - SnmpRecvMsg
  - …process the PDU and formulate reply
  - SnmpSendMsg

SNMP Operations

- GET – Read a variable
- GET NEXT – Read the next variable
- GET BULK – Read a bunch of variables
- SET – Write a variable

Conclusion

- WinSNMP provides a good set of tools for adding SNMP to an application
- SwiftForth provides an easy yet powerful interface to dynamic libraries
- Interactive testing typical of a Forth system makes for a stable finished product