

Data Packet Format

CONFIDENTIAL

Application Note 2 **Sensor Node Software**

GainSpan Data Packet Format

INTRODUCTION

THIS DOCUMENT describes the GainSpan Data Packet Format rev0.1 (DPF0.1). This format is used when GainSpan reference applications send sensor data in UDP packets to listening data servers. The descriptions in this document are for reference purposes only and are subject to change at any time.

PACKET CATEGORIES

The GainSpan reference applications generate many packets, all of which fall into three main categories:

- ▶ Network layer packets
- ▶ Management packets
- ▶ Data packets

Network Layer Packets

Network layer packets are used to establish and maintain a network connection. They include 802.11 scanning, authentication, and association frames, DHCP packets and ARP packets. These packets are sent automatically by the network stack during network join, release, and rejoin processes.

Management Packets

Management packets are sent between the node and a network management system (NMS). The protocol for all of these packets is SNMP.

1. The node sends SNMP TRAP packets from a random UDP port to NMS UDP port 162.
2. The NMS sends SET and GET request packets from a random UDP port to node UDP port 161.
3. The node sends SNMP GET-RESPONSE packets from UDP port 161 to the port UDP from which NMS had sent the request.

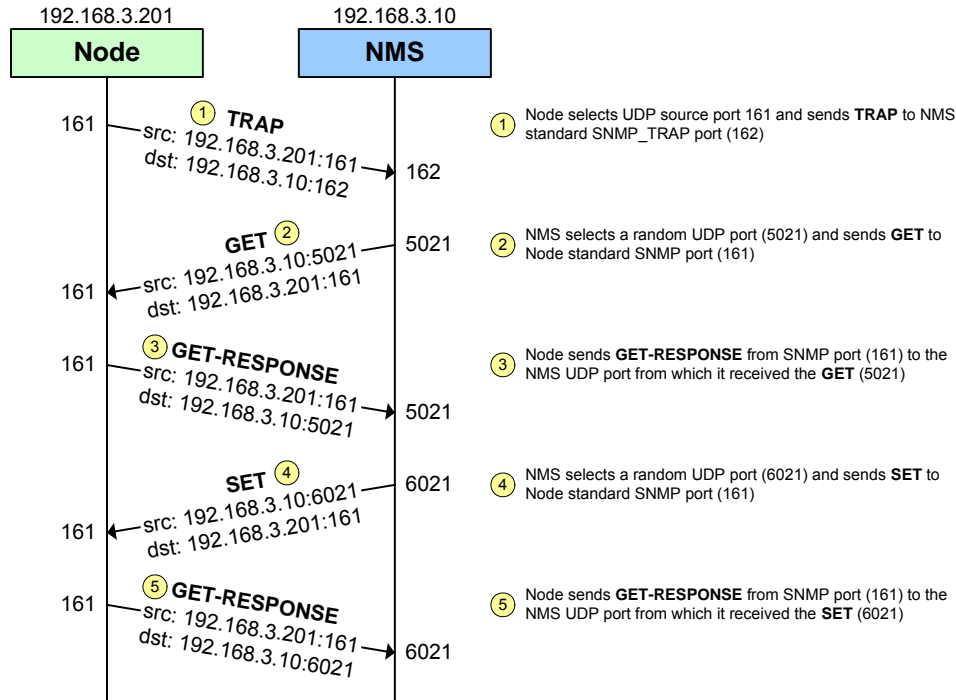


Figure 1: SNMP message flow, showing UDP ports.

Data Packets

The rest of this document describes the format for data packets. These packets are used to convey sensor data to listening data servers. The demo has multiple sensors. The demo software takes a sample from each sensor. It then formats all of these samples in a single packet and sends it to a data server. Both the frequency with which the sensors are read and the destination to which the data is sent (IPaddress:udpPort) are configurable. By default, the destination address is the same as for the NMS and the data packets are sent to its UDP port 8255 from a random node UDP port.

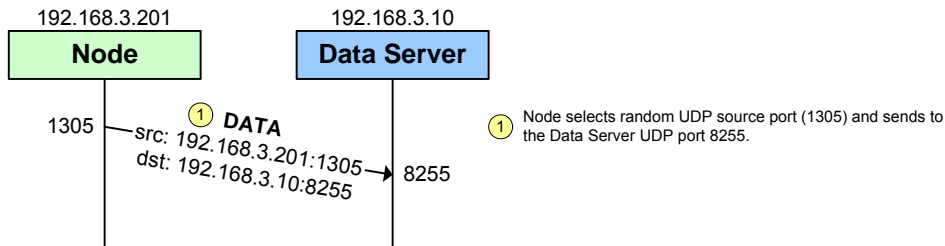


Figure 2: Data packet flow, showing UDP ports.

DATA PACKET FORMAT

The Data Packet Format rev0.1 (DPF0.1) is quite simple. It consists of the following fields:

<SensorID> <BatteryADC> <LightADC> <TempADC> <RSSI>

Table 1: Data Packet Format Fields

Field	Description
SensorID	Denotes the sensor from which the data was sampled. For DPF0.1, this will always be 5.
BatteryADC	Raw ADC conversion of vdd_rtc/3. Sent "Little Endian": <MSB> <LSB> Note that on the T&L board, vdd_rtc is not the true battery voltage. There is some protection circuitry that results in about a 0.5V drop. $V_{batt} = (3.6/1024) * \text{<BatteryADC>} + 0.5$
LightADC	Raw ADC conversion of light sensor voltage. Sent "Little Endian": <MSB> <LSB> To convert this to Lux, use this formula: $\text{Lux} = 1.324 * \text{<LightADC>}$
TempADC	Raw ADC conversion of light sensor voltage. Sent "Little Endian": <MSB> <LSB> To convert this to Celsius, use this formula: $\text{TempC} = 3890 / (\ln((1024 / \text{<TempADC>}) - 1) + 13) - 273.15$
RSSI	WLAN Received Signal Strength Indicator (RSSI). Sent as a single signed byte (2s complement). Nominally measured at the antenna, in dBm.

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