

Diagnostic & Statistics Registers.

The Radios have a range of internal registers that hold information on connectivity to other radios and other useful radio statistical information.

Below are the Register locations and a brief description of what they monitor.

Most of these diagnostic registers are available in the following radio devices , i.e. 415U-2-Cx, 415U-E-Cx, 215U-2, 925U-2 & 915U-2. The 115E-2 has none of the radio related register locations.

Digital	Value	Description
10401	BSR Repeater Status	If BSR Function is being used this will show the Primary/Secondary status
10402	Hardware Fault - PA temp	Radio Power Amplifier over temp Alarm.
10403	Hardware Fault - Internal Fault	Radio General hardware Fault.
10404	Hardware Fault - Freq Lock error	Radio PLL Frequency Lock error.
10405	Hardware Fault - Antenna VSWR	Antenna VSWR Fault – Check Antenna/Coax cables.
30401	Upstream RSSI	When connected as a Remote, Mesh Node, Repeater, or a Manual Client the RSSI of the connected upstream device in
30402	Upstream Connected time (hours)	Connected Time: When connected as a Remote, Mesh Node, Repeater, or a Manual Client, the time (in hours) that the connection to the upstream device has been made.
30403	Upstream generation counter	Generation Count: When configured as a Remote, Mesh Node, Repeater, or Manual Client, the generation count of the connection to the upstream device. This is the number of times the connection has been lost and re-established
30404-5	Upstream IP Address	Upstream IP Address: When configured as a Remote, Mesh Node, Repeater, or Manual Client, the IP Address of the
30406	Current Channel Number	Current Radio Channel if using frequency agility. (0 = Primary Radio channel, 1-10 = Advanced Roaming scan list index #.
30407-8	Tx Frequency in Hz (Read as Long word – MSB)	Radio Transmit Frequency (in Hz). 32-bit. Most significant word at lower (odd) address.
30409-10	Rx Frequency in Hz (Read as Long word – MSB)	Radio Receive Frequency (in Hz). 32-bit. Most significant word at lower (odd) address. (As for Transmit Frequency)
30411	Module uptime (hours)	Module uptime: The time (in hours) that this module has been up and running
30412	Channel Utilisation % (last 60 Seconds)	Average % Channel Utilization over the last 60 seconds.
30413	Background Noise (last 60 seconds)	Average Background Noise over the last 60 seconds.
30414	Tx retry % (last 60 seconds)	Tx retry % (average of last 60 seconds): The percentage of total transmissions that required at least one retry.
30415	Tx failed % (last 60 seconds)	Tx failed % (average of last 60 seconds): The percentage of total transmissions that failed to get an acknowledgement after all retries exhausted.
30416	Channel Utilisation % (last 60 minutes)	Average % Channel Utilization over the last 60 minutes.

30417	Background Noise (last 60 minutes)	Average Background Noise over the last 60 minutes.
30418	Tx retry % (average of last 60 minutes)	Tx retry % (average of last 60 minutes): The percentage of total transmissions that required at least one retry.
30419	Tx failed % (average of last 60 minutes)	Tx failed % (average of last 60 minutes): The percentage of total transmissions that failed to get an acknowledgement after all retries exhausted.
30420	Channel Utilisation % (last 60 hours)	Average % Channel Utilization over the last 60 minutes.
30421	Background Noise (last 60 hours)	Average Background Noise over the last 60 minutes.
30422	Tx retry % (average of last 60 hours)	Tx retry % (average of last 60 minutes): The percentage of total transmissions that required at least one retry.
30423	Tx failed % (average of last 60 hours)	Tx failed % (average of last 60 minutes): The percentage of total transmissions that failed to get an acknowledgement after all retries exhausted.
30424	Radio Power Amplifier Temperature	Radio PA temperature is the value minus an offset of 100, i.e. 60 = -40°C, 125 = 25°C, 170 = 70°C etc.).
30425	Radio primary data rate	Base = Base Rate, Remotes = Upstream connected data rate.
30491	Logic Engine Status	Shows status of the Logic Engine (if enabled). 0 = Stopped, 256 = Running, 16384 = Overrun.
30430	Broker Connection	Broker Connection
30431	Broker Link Count	Broker Link Count
30432&3	Broker Up time	Broker Up time
30434&5	Broker Message Sent	Broker Message Sent
30436&7	Broker Message Received	Broker Message Received
30438	Broker Queued Messages	Broker Queued Messages
30439&40	Broker Bytes Sent	Broker Bytes Sent
30441&2	Broker Bytes Received	Broker Bytes Received
30494	Serial number – First 4 digits	Manufacture Month/Year, e.g. 617 = 06/17
30495	Serial number – Next 3 digits	Manufactured Firmware Version, e.g. 220 = V2.20
30496	Serial Number – Last 4 digits	Serial number for corresponding date.
30497x4	Current Firmware Version	E.g. Firmware V 2.24p2 would show as per below 4 registers
30497	Current Firmware Ver – First	Current Firmware Version – Primary, e.g. 2 = V2
30498	Current Firmware Ver – Second	Current Firmware Version – secondary, e.g. 24 = .24
30499	Current Firmware Ver – Third	Current Firmware Version – Third, e.g. 0 = .0 (if used)
30500	Current Firmware Ver – Fourth	Current Firmware Version – Patch, e.g. 2 = p2
32001 - 32255	RSSI List: When configured as a Base, Repeater, or Manual AP.	The RSSI of each connected downstream radio is added to an I/O register according to the last byte of that device's IP Address. For example, a downstream device with IP Address 192.168.0.199 will have its RSSI stored in I/O register 32000 + 199 = 32199.

Module compatibility

Register	Description	415U-X	215U-2	115E-2	915U-2	925U-2
30401	Upstream RSSI	✓	✓	N/A	✗	✓
30402	Upstream Connected time (hours)	✓	✓	N/A	✗	✓
30403	Upstream generation counter	✓	✓	N/A	✗	✓
30404-5	Upstream IP Address	✓	✓	N/A	✗	✓
30406	Current Channel Number	✓	✓	N/A	✗	✓
30407-8	Tx Frequency in Hz (Read as long word – MSB)	✓	✓	N/A	✗	✓
30409-10	Rx Frequency in Hz (Read as long word – MSB)	✓	✓	N/A	✗	✓
30411	Module uptime (hours)	✓	✓	✗	✗	✓
30412	Channel Utilisation % (last 60 Seconds)	✓	✓	N/A	✗	✓
30413	Background Noise (last 60 seconds)	✓	✓	N/A	✗	✓
30414	Tx retry % (last 60 seconds)	✓	✓	N/A	✗	✓
30415	Tx failed % (last 60 seconds)	✓	✓	N/A	✗	✓
30416	Channel Utilisation % (last 60 minutes)	✓	✓	N/A	✗	✓
30417	Background Noise (last 60 minutes)	✓	✓	N/A	✗	✓
30418	Tx retry % (average of last 60 minutes)	✓	✓	N/A	✗	✓
30419	Tx failed % (average of last 60 minutes)	✓	✓	N/A	✗	✓
30420	Channel Utilisation % (last 60 hours)	✓	✓	N/A	✗	✓
30421	Background Noise (last 60 hours)	✓	✓	N/A	✗	✓
30422	Tx retry % (average of last 60 hours)	✓	✓	N/A	✗	✓
30423	Tx failed % (average of last 60 hours)	✓	✓	N/A	✗	✓
30424	Radio Power Amplifier Temperature	✓	✗	N/A	✗	✓
30425	Radio primary data rate	✓	✗	N/A	✗	✓

30491	Logic Engine Status	✓	✓	✓	✗	✓
30494	Serial number – First 4 digits	✓	✓	✓	✓	✓
30495	Serial number – Next 3 digits	✓	✓	✓	✓	✓
30496	Serial Number – Last 4 digits	✓	✓	✓	✓	✓
30497-30500	Current Firmware Version	✓	✓	✓	✓	✓
32001-32255	RSSI List: When configured as a Base, Repeater, or Manual AP.	✓	✓	N/A	✗	✓
30501-30595	RSSI List: Only for a 915U-2 when configured in Legacy mode	✗	✗	N/A	✓	✗

Full Register List

<i>Digital output registers (coils)</i>	
Address range	Description
0001 – 0008	Local DIO1–DIO8 as digital outputs
0009 – 0020	Spare
0021 – 0400	Space reserved for locally attached 115s expansion I/O modules. Twenty register per module address, maximum number of modules is 19.
0401 – 16000	General purpose bit storage used for: Staging area for data concentrator; Fieldbus mappings storage; Force mapping registers
<i>Digital input registers (bits)</i>	
10001 – 10008	Local DIO1–DIO8 as digital inputs
10009 – 10012	Set point status from analog inputs 1 through 4
10013 – 10016	Set points for the VSupply, 24V Loop supply, VBatt (Low Volts) and Expansion Supply
10017 - 10020	Set point status from analog inputs 1 through 4 when configured in voltage mode.
10021 – 10400	Space for locally attached 115s expansion I/O modules. Twenty register per module address, Maximum number of modules is 19.
10401	Reserved - Used for repeater status indication
10402-10405	Radio hard fault status flags
10402	Radio power amplifier over temperature
10403	Radio general hardware fault
10404	Radio frequency lock error
10405	Antenna VSWR fault

10501 – 16000	General purpose bit storage used for: Staging area for data concentrator; Fieldbus mappings storage;
Input registers (words)	
30001 – 30004	Local AI1–AI4 (analog inputs, current mode) AI1 and AI2: 4–20 mA differential AI3 and AI4: 4–20 mA sink
30005	Local supply voltage 0–40 V scales to 0-20mA
30006	Local 24 V loop voltage 0–40 V scales to 0-20mA
30007	Local battery voltage 0–40 V scales to 0-20mA
30008	115S supply voltage 0–40 V scales to 0-20mA
30009 – 30010	Local AI1, AI2, Voltage Mode. 0-24V Scales to 0-24mA.
30011 – 30012	Local AI3, AI4, Voltage Mode. 0-5V Scales to 0-20mA
30013 – 30016	Local pulse input rates: PI1–PI4
30018 – 30020	Spare
30021 - 30400	Space for locally attached 115s expansion I/O modules. Twenty registers per module address, maximum number of modules is 19.
30401	RSSI: When configured as a Remote, MeshNode, Repeater, or Manual Client, the RSSI of the connected upstream device in (negative)dBm
30402	Connected Time: When configured as a Remote, MeshNode, Repeater, or Manual Client, the time (in hours) that the connection to the upstream device has been made.
30403	Generation Count: When configured as a Remote, MeshNode, Repeater, or Manual Client, the generation count of the connection to the upstream device. This is the number of times the connection has been lost and re-established
30404 – 30405	Upstream IP Address: When configured as a Remote, MeshNode, Repeater, or Manual Client, the IP Address of the upstream device. Most Significant Byte High byte of Register 30404 Second Byte Low byte of Register 30404 Third Byte High byte of register 30405 Least Significant Byte Low byte of register 30405
30406	Current Radio Channel for frequency agility
30407 – 30408	Radio Transmit Frequency (in Hz). 32-bit. Most significant word at lower (odd) address.
30409 – 30410	Radio Receive Frequency (in Hz). 32-bit. Most significant word at lower (odd) address. (As for Transmit Frequency)
30411	Module uptime: The time (in hours) that this module has been up and running
30412	Channel Utilization % (average of last 60 seconds)
30413	Background Noise (average of last 60 seconds)
30414	Tx retry % (average of last 60 seconds): The percentage of total transmissions that required at least one retry
30415	Tx failed % (average of last 60 seconds): The percentage of total transmissions that failed to get an acknowledgement after all retries exhausted.

30416 – 30419	Channel Utilization, Background noise, Tx Retry % and Tx Failed % (average of the last 60 minutes)
30420 – 30423	Channel Utilization, Background noise, Tx Retry % and Tx Failed % (average of the last 60 hours)
30424	Radio Power Amplifier Temperature. Actual temperature is reading - 100 °C. (-40 °C reads as 60, 25 °C reads as 125, 70 °C reads as 170 etc).
30425	Radio primary connection data rate (Upstream data rate).
30426 – 30490	Spare - General purpose word storage used for: Staging area for data concentrator; Fieldbus mappings storage;
30491	Logic Engine Execution State: 0 -> Stopped. 256 -> Running; 32768 -> Overrun
30494 – 30500	Internal information registers: serial number, firmware version and patch level
30494	First four digits of serial number (Encodes Manufacture Month & Year)
30495	Next three digits of serial number (Encodes Manufactured Firmware version)
30496	Remaining four digits of the serial number
30497	First part of Current Firmware version
30498	Second part of Current Firmware version
30499	Third part of Current firmware version
30500	Patch Level of current firmware version
30501 – 32000	General purpose word storage used for: Staging area for data concentrator; Fieldbus mappings storage;
32001 - 32255	RSSI List: When configured as an Base, Repeater, or Manual AP. The RSSI of each connected downstream is added to an I/O register according to the last byte of that device's IP Address. For example, a downstream device with IP Address 192.168.0.199 will have its RSSI stored in I/O register 32000 + 199 = 32199. If no device is connected with that IP address, the corresponding register has the value Zero.
32256 – 36000	General purpose word storage used for: Staging area for data concentrator; Fieldbus mappings storage;
36001 - 36008	Local pulsed inputs 1–4, big endian format Most significant word at lower/odd address
36009 – 36040	Spare space for 32-bit register values
36041 – 38000	Spare space for 32-bit register values
38001 - 38032	Local analog inputs as floating-point values. ModScan format (sign + exponent + most significant 7 bits of significant at even/higher addressed location; lower 16 bits of significant at lower/odd, addressed location) (example: Analog input 1 at 12.3 mA gives registers 38001=CCCD, 38002=4144)
38033 – 40000	Spare space for floating point values
Output registers (holding registers)	
40001 – 40002	Local AO1 and AO2 analog outputs
40003 – 40020	Spare

<i>40021 – 40400</i>	Space for locally attached 115s expansion I/O modules. Twenty registers per module address, maximum number of modules is 19.
<i>40501 – 46000</i>	General purpose word storage area used for: Staging area for data concentrator; Fieldbus mappings storage
<i>46001 – 46008</i>	Local pulsed outputs 1–4. Big endian format. Most significant word at lower/odd address
<i>46009 – 48000</i>	Spare 32-bit registers
<i>48001 – 48004</i>	Local analog outputs as floating-point values. ModScan format (sign + exponent + most significant 7 bits of significant at even/higher addressed location) Lower 16 bits of significant at lower/odd, addressed location (example: Analog output 1 at 12.3 mA gives registers 48001=CCCD, 48002=4144)
<i>48009 – 50000</i>	Spare space for floating point values
<i>50001</i>	Onwards Not available