

LG VRF Zigbee Interface Specification

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Interface overview

The LG VRF Indoor Unit (IDU) contains a Zigbee radio that hosts Zigbee attributes that allow external user interface devices (such as a 3rd party thermostat) to read and write operational parameters such as operating mode, setpoint, and fan speed.

Attribute interface

The attribute interface takes advantage of Zigbee HA standard HVAC attributes where possible, and defines proprietary attributes where necessary.

Further details, including data types and units, can be found in Rev 6 of the Zigbee Cluster Library Specification (<http://www.zigbee.org/~zigbeeor/wp-content/uploads/2014/10/07-5123-06-zigbee-cluster-library-specification.pdf>).

IDU attributes

The following attributes are hosted by the IDU.

HVAC Thermostat attributes

The following attributes reside on the HVAC Thermostat cluster (cluster ID 0x0201).

Attribute name	Attribute ID	Access	Description
LocalTemperature	0x0000	R	Local temperature measured at the IDU.
AbsMinHeatSetpointLimit	0x0003	R	Heat setpoint minimum value.
AbsMaxHeatSetpointLimit	0x0004	R	Heat setpoint maximum value.
AbsMinCoolSetpointLimit	0x0005	R	Cool setpoint minimum value.
AbsMaxCoolSetpointLimit	0x0006	R	Cool setpoint maximum value.
OccupiedCoolingSetpoint	0x0011	RW	Setpoint currently in use for cool mode.
OccupiedHeatingSetpoint	0x0012	RW	Setpoint currently in use for heat mode.
ControlSequenceOfOperation	0x001b	R	Operating modes allowed in the current configuration. 0: Cooling only 2: Heating only 4: Cooling and heating
SystemMode	0x001c	RW	Selected operating mode 0: Off 1: Auto 3: Cool 4: Heat 7: Fan only Note that it is not required that the LG controller support "Auto" mode. The 3 rd Party thermostat will not select "Auto". It is included here for completeness.

Fan Control attributes

The following attributes reside on the HVAC Fan Control cluster (cluster ID 0x0202).

Attribute name	Attribute ID	Access	Description
FanMode	0x0000	RW	Selected fan mode 1: Low 2: Medium 3: High 4: On 5: Auto The <i>On</i> state is only valid for the single fan speed case.
FanModeSequence	0x0001	R	Fan modes allowed in the current configuration. 2: Low/Med/High/Auto 3: Low/High/Auto 4: On/Auto

LG Proprietary Attributes

The following attributes reside on the LGE Air Conditioner cluster (cluster ID 0xfc14).

Attribute name	Type	Attribute ID	Access	Description
ErrorCode	ENUM8	0x0000	R	Air conditioner error code 0: No error other: error code
LockCode	BITMAP16	0x0001	R	Air conditioner lock code Bit 0: Extraordinary Operation Bit 1: Central controller all lock Bit 2: Central controller Setpoint lock Bit 3: Central controller Fan lock Bit 4: Central controller Mode lock Bit 5: Central controller Setpoint Range lock Bit 6: Group control in use Bit 7: Dry contact lock Bit 8: Central control in use Bit 9: Defrost Operation
RemoteCfSwitch	ENUM8	0x0002	RW	Air conditioner Celsius/Fahrenheit display setting 0: Celsius 1: Fahrenheit

3rd Party Thermostat Attributes

HVAC Thermostat attributes

The following attributes reside on the HVAC Thermostat cluster (cluster ID 0x0201).

Attribute name	Attribute ID	Access	Description
LocalTemperature	0x0000	R	Local temperature measured at the Telkonet thermostat.

The following attributes reside on the LGE Air Conditioner cluster (cluster ID 0xfc14).

Attribute name	Attribute ID	Access	Description

RoundedLocalTemperature	0x0003	R	Local temperature measured at the 3 rd Party thermostat, rounded to nearest 0.5°C.
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Zigbee network operations

The 3rd Party thermostat will be configured either as a router or sleepy end device. If the thermostat is battery powered, it must be configured as a sleepy end device.

The LG VRF IDU must operate as a Zigbee Router. This configuration supports both a distributed network where the IDU forms the network, and a centralized networks with the addition of a coordinator.

Before the 3rd Party thermostat can communicate with the IDU,

1. The IDU must form a distributed network or join an existing Zigbee network, and
2. The 3rd Party thermostat must join the network and then bind to the IDU

To support these operations, the IDU must support the standard Zigbee network formation and join operation. The 3rd Party thermostat will automatically bind to the IDU when it joins the network.

Device binding will follow the finding and binding procedure outlined in section 8.5 (target - IDU), and 8.6 (initiator - thermostat), of the Zigbee Base Device Behavior Specification.

<http://www.zigbee.org/wp-content/uploads/2014/10/docs-13-0402-13-00zi-Base-Device-Behavior-Specification-2.pdf>

In addition, the 3rd Party thermostat needs to be able to identify the joining device as an LG VRF IDU. The IDU will support the following attributes in the Basic cluster (cluster ID 0x0000):

Attribute name	Attribute ID	Access	Description
ManufacturerName	0x0004	R	String identifying the manufacturer as LG
ModelIdentifier	0x0005	R	String identifying the model of the IDU

The join operation should be able to be initiated via a user interface at the IDU (typically a pushbutton). The IDU should follow the Procedure outlined in 'Figure 2–Top level commissioning procedure' in the Base Device Behavior Specification. The IDU should attempt to join a network, and if unsuccessful, it should form a network. Next, it should enable joining and finding and binding for 90 seconds. If the IDU is already on a network, then it will just enable joining and finding and binding for 90 seconds.

The 3rd Party thermostat will also have a UI that initiates the process at that side. The join process must be initiated in the 90 second Window described above.

Thermostat endpoint

The thermostat cluster resides on endpoint 10.

Multiple master support

It is possible that multiple user interface devices will have the capability to write to the IDU's Zigbee attributes, either over the Zigbee interface or via an alternate interface (such as IR or RS485) supported by the IDU. It is the responsibility of each master device to periodically read the attributes to detect any remote changes, and update its internal state accordingly.

Operation

When the thermostat joins the network and verifies that it is bound to the IDU, it will automatically configure the RoundedLocalTemperature attribute to report to the IDU every 30 seconds.

The thermostat will read the HVAC and fan attributes from the IDU periodically (typically every 10 seconds).

The thermostat will read the LG proprietary attributes (error code, lock code, and CF switch) from the IDU periodically (typically every 30 seconds). When the thermostat detects the IDU is in a lock state (Setpoint, Fan, Mode, or All), the thermostat will internally lock its associated setting(s), preventing the user from making changes.

When a user changes the HVAC settings, the thermostat will write the new attribute values to the IDU.

When a user changes the HVAC settings, the thermostat will write the new attribute values to the IDU.

When a user changes the Celsius/Fahrenheit display setting, the thermostat will write to the RemoteCfSwitch attribute in the IDU.

On/offline Status

The thermostat will indicate offline if it does not receive a response to 3 consecutive read attempts. The IDU should adopt a similar strategy by monitoring temperature attribute reports to determine if the thermostat is down.