

Client View Engine

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Chapter 6

Directory Documentation

6.1 api Directory Reference

Files

- file `__init__.py`
- file `stateapi.py`

6.2 command Directory Reference

Files

- file `basics.py`
- file `bss_tm_cmd.py`
- file `link_measurement_cmd.py`
- file `neighbor_cmd.py`
- file `request_beacon_cmd.py`

6.3 control Directory Reference

Files

- file `__init__.py`
- file `controller.py`
- file `hostapd.py`

6.4 dashboard Directory Reference

Files

- file `__init__.py`
- file `bmrep_dashboard.py`
- file `bsstm_dashboard.py`
- file `lmrep_dashboard.py`
- file `nbrank_dashboard.py`
- file `neighbor_dashboard.py`
- file `pipe_pool.py`
- file `qoe_dashboard.py`
- file `socket_pool.py`
- file `station_dashboard.py`

6.5 db Directory Reference

Files

- file `__init__.py`
- file `bmrep_db.py`
- file `bsstm_db.py`
- file `lmrep_db.py`
- file `nbrank_db.py`
- file `neighbor_db.py`
- file `qoe_db.py`
- file `station_db.py`

6.6 defaults Directory Reference

Files

- file `__init__.py`
- file `enums.py`
- file `info.py`

6.7 metrics Directory Reference

Files

- file `__init__.py`
- file `nbranking.py`
- file `qoe.py`
- file `tm_engine.py`

6.8 model Directory Reference

Files

- file `__init__.py`
- file `ap.py`
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- file `measurement.py`
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- file `station.py`

6.9 parser Directory Reference

Files

- file `ap_parser.py`
- file `measurement_parser.py`
- file `neighbor_parser.py`
- file `station_parser.py`

6.10 protocol Directory Reference

Files

- file `rxmlux.py`

6.11 store Directory Reference

Files

- file `__init__.py`
- file `acceptance.py`
- file `routine.py`

6.12 tests Directory Reference

Files

- file `__init__.py`
- file `test_add_neib.py`
- file `test_bm.py`
- file `test_bss_tm.py`
- file `test_lm.py`

Chapter 7

Namespace Documentation

7.1 ap_parser Namespace Reference

Classes

- class [APParser](#)

7.2 api Namespace Reference

Namespaces

- namespace [stateapi](#)

7.3 api.stateapi Namespace Reference

Classes

- class [StateAPI](#)

7.4 basics Namespace Reference

Classes

- class [BasicCommand](#)

7.5 bss_tm_cmd Namespace Reference

Classes

- class [ReqMode](#)
- class [BssTmRequestBuilder](#)

7.6 control Namespace Reference

Namespaces

- namespace [controller](#)
- namespace [hostapd](#)

7.7 control.controller Namespace Reference

Classes

- class [Controller](#)

Variables

- float [CONTROLLER_WAIT_LOOP_SEC](#) = 0.5

7.7.1 Variable Documentation

7.7.1.1 [CONTROLLER_WAIT_LOOP_SEC](#)

```
float control.controller.CONTROLLER_WAIT_LOOP_SEC = 0.5
```

7.8 control.hostapd Namespace Reference

Classes

- class [LastCommandStatus](#)
- class [HostapdController](#)

Variables

- [controller](#) = [HostapdController\(\)](#)

7.8.1 Variable Documentation

7.8.1.1 [controller](#)

```
control.hostapd.controller = HostapdController\(\)
```

7.9 dashboard Namespace Reference

Namespaces

- namespace [bmrep_dashboard](#)
- namespace [bsstm_dashboard](#)
- namespace [lmrep_dashboard](#)
- namespace [nbrank_dashboard](#)
- namespace [neighbor_dashboard](#)
- namespace [pipe_pool](#)
- namespace [qoe_dashboard](#)
- namespace [socket_pool](#)
- namespace [station_dashboard](#)

7.10 dashboard.bmrep_dashboard Namespace Reference

Classes

- class [BeaconMeasurementDashboard](#)

Functions

- [write_stream](#) (pipe_or_sock, str text)

7.10.1 Function Documentation

7.10.1.1 [write_stream\(\)](#)

```
dashboard.bmrep_dashboard.write_stream (
    pipe_or_sock,
    str text)
```

Write text to either a pipe (file) or a socket transparently.

7.11 dashboard.bsstm_dashboard Namespace Reference

Classes

- class [BSSTransitionResponseDashboard](#)

Functions

- [write_stream](#) (pipe_or_sock, str text)

7.11.1 Function Documentation

7.11.1.1 `write_stream()`

```
dashboard.bsstm_dashboard.write_stream (
    pipe_or_sock,
    str text)
```

Write text to either a pipe (file) or a socket transparently.

7.12 dashboard.lmrep_dashboard Namespace Reference

Classes

- class [LinkMeasurementDashboard](#)

Functions

- `write_stream` (pipe_or_sock, str text)

7.12.1 Function Documentation

7.12.1.1 `write_stream()`

```
dashboard.lmrep_dashboard.write_stream (
    pipe_or_sock,
    str text)
```

Write text to either a pipe (file) or a socket transparently.

7.13 dashboard.nbrank_dashboard Namespace Reference

Classes

- class [NeighborRankingDashboard](#)

Functions

- `write_stream` (pipe_or_sock, str text)
- `rcpi_to_db` (rcpi_val)
- `rsni_to_db` (rsni_val)

7.13.1 Function Documentation

7.13.1.1 `rcpi_to_db()`

```
dashboard.nbrank_dashboard.rcpi_to_db (
    rcpi_val)
```

Convert RCPI (0..220) to dBm. RCPI to RSSI dBm: dBm = RCPI/2 - 110. Show N/A if invalid.

7.13.1.2 `rsni_to_db()`

```
dashboard.nbrank_dashboard.rsnr_to_db (
    rsni_val)
```

Convert RSNI (0..255) to dB. RSNI to dB: value = RSNI/2 dB. Show N/A if invalid.

7.13.1.3 `write_stream()`

```
dashboard.nbrank_dashboard.write_stream (
    pipe_or_sock,
    str text)
```

Write text to either a pipe (file) or a socket transparently.

7.14 dashboard.neighbor_dashboard Namespace Reference

Classes

- class [NeighborDashboard](#)

Functions

- [`write_stream`](#) (*pipe_or_sock*, *str text*)

7.14.1 Function Documentation

7.14.1.1 `write_stream()`

```
dashboard.neighbor_dashboard.write_stream (
    pipe_or_sock,
    str text)
```

Write text to either a pipe (file) or a socket transparently.

7.15 dashboard.pipe_pool Namespace Reference

Classes

- class [PipePool](#)

7.16 dashboard.qoe_dashboard Namespace Reference

Classes

- class [QoEDashboard](#)

Functions

- [write_stream](#) (pipe_or_sock, str text)

7.16.1 Function Documentation

7.16.1.1 [write_stream\(\)](#)

```
dashboard.qoe_dashboard.write_stream (
    pipe_or_sock,
    str text)
```

Write text to either a pipe (file) or a socket transparently.

7.17 dashboard.socket_pool Namespace Reference

Classes

- class [ClientConnection](#)
- class [SocketPool](#)

7.18 dashboard.station_dashboard Namespace Reference

Classes

- class [StationDashboard](#)

Functions

- [write_stream](#) (out, str text)
- str [read_stream](#) (inp)

7.18.1 Function Documentation

7.18.1.1 `read_stream()`

```
str dashboard.station_dashboard.read_stream (
    inp)
```

7.18.1.2 `write_stream()`

```
dashboard.station_dashboard.write_stream (
    out,
    str text)
```

7.19 db Namespace Reference

Namespaces

- namespace `bmrep_db`
- namespace `bsstm_db`
- namespace `lmrep_db`
- namespace `nbrank_db`
- namespace `neighbor_db`
- namespace `qoe_db`
- namespace `station_db`

7.20 db.bmrep_db Namespace Reference

Classes

- class `BeaconMeasurementDB`

Variables

- str `DEFAULT_STA_MAC` = "00:00:00:00:00:00"
- int `EXPIRE_SEC` = 300

7.20.1 Variable Documentation

7.20.1.1 `DEFAULT_STA_MAC`

```
str db.bmrep_db.DEFAULT_STA_MAC = "00:00:00:00:00:00"
```

7.20.1.2 `EXPIRE_SEC`

```
int db.bmrep_db.EXPIRE_SEC = 300
```

7.21 db.bsstm_db Namespace Reference

Classes

- class [BSSTransitionResponseDB](#)

Variables

- str [DEFAULT_STA_MAC](#) = "00:00:00:00:00:00"

7.21.1 Variable Documentation

7.21.1.1 DEFAULT_STA_MAC

```
str db.bsstm_db.DEFAULT_STA_MAC = "00:00:00:00:00:00"
```

7.22 db.lmrep_db Namespace Reference

Classes

- class [LinkMeasurementDB](#)

Variables

- str [DEFAULT_STA_MAC](#) = "00:00:00:00:00:00"

7.22.1 Variable Documentation

7.22.1.1 DEFAULT_STA_MAC

```
str db.lmrep_db.DEFAULT_STA_MAC = "00:00:00:00:00:00"
```

7.23 db.nbrank_db Namespace Reference

Classes

- class [NeighborRankingDB](#)

Variables

- str [DEFAULT_STA_MAC](#) = "00:00:00:00:00:00"

7.23.1 Variable Documentation

7.23.1.1 DEFAULT_STA_MAC

```
str db.nbrank_db.DEFAULT_STA_MAC = "00:00:00:00:00:00"
```

7.24 db.neighbor_db Namespace Reference

Classes

- class [NeighborDB](#)

Variables

- str [DEFAULT_STA_MAC](#) = "00:00:00:00:00:00"

7.24.1 Variable Documentation

7.24.1.1 DEFAULT_STA_MAC

```
str db.neighbor_db.DEFAULT_STA_MAC = "00:00:00:00:00:00"
```

7.25 db.qoe_db Namespace Reference

Classes

- class [QoEDB](#)

7.26 db.station_db Namespace Reference

Classes

- class [StationDB](#)

7.27 defaults Namespace Reference

Namespaces

- namespace [enums](#)
- namespace [info](#)

7.28 defaults.enums Namespace Reference

Classes

- class [WiFi24GHZChannels](#)
- class [WiFi24GHZChannelsNo](#)
- class [WiFiOperatingClass](#)

7.29 defaults.info Namespace Reference

Variables

- dict [CAPABILITY_FLAGS](#)
- dict [EXT_CAPABILITY_FLAGS](#)
- dict [OPERATING_CLASS_TABLE](#)
- dict [PHY_TYPE_TABLE](#)

7.29.1 Variable Documentation

7.29.1.1 CAPABILITY_FLAGS

```
dict defaults.info.CAPABILITY_FLAGS
```

Initial value:

```
00001 = {
00002     0x0001: "ESS",
00003     0x0002: "IBSS",
00004     0x0004: "CF_POLLABLE",
00005     0x0008: "CF_POLL_REQUEST",
00006     0x0010: "PRIVACY",
00007     0x0020: "SHORT_PREAMBLE",
00008     0x0040: "PBCC",
00009     0x0080: "CHANNEL_AGILITY",
00010    0x0100: "SPECTRUM_MGMT",
00011    0x0200: "QOS",
00012    0x0400: "SHORT_SLOT_TIME",
00013    0x0800: "APSD",
00014    0x1000: "RADIO_MEASUREMENT",
00015    0x2000: "DSSS_OFDM",
00016    0x4000: "DELAYED_BA",
00017    0x8000: "IMMEDIATE_BA",
00018 }
```

7.29.1.2 EXT_CAPABILITY_FLAGS

```
dict defaults.info.EXT_CAPABILITY_FLAGS
```

Initial value:

```
00001 = {
00002     0: "20_40_BSS_COEXISTENCE",
00003     1: "EXT_CHANNEL_SWITCHING",
00004     2: "PSMP_CAP",
00005     3: "SPSMP_CAP",
00006     8: "FMS",
00007     9: "PROXY_ARP",
00008    10: "COLLOCATED_INTERFERENCE",
00009    11: "CIVIC_LOCATION",
00010    12: "GEOSPACIAL_LOCATION",
00011    16: "TFS",
00012    17: "WNM_SLEEP_MODE",
00013    18: "TIM_BROADCAST",
00014    19: "BSS_TRANSITION",
00015    24: "TIMING_MEASUREMENT",
00016    25: "CHANNEL_USAGE",
00017    26: "SSID_LIST",
00018    40: "FILS_CAP",
00019    41: "TWT_REQUESTER",
00020    42: "TWT_RESPONDER",
00021 }
```

7.29.1.3 OPERATING_CLASS_TABLE

```
dict defaults.info.OPERATING_CLASS_TABLE
```

Initial value:

```
00001 = {
00002     81: "2.4GHz 20MHz (channels 1...13)",
00003     82: "2.4GHz 40MHz (channels 3...11)",
00004     83: "2.4GHz 20MHz (channel 14)",
00005     115: "5GHz 20MHz (36...48)",
00006     116: "5GHz 40MHz (38...46)",
00007     117: "5GHz 80MHz (42)",
00008     118: "5GHz 160MHz (50)",
00009     119: "5GHz 20MHz (52...64)",
00010    120: "5GHz 40MHz (54...62)",
00011    121: "5GHz 80MHz (58)",
00012    122: "5GHz 160MHz (50)",
00013    125: "6GHz 20MHz (1...233)",
00014    126: "6GHz 40MHz (3...231)",
00015    127: "6GHz 80MHz (7...227)",
00016    128: "6GHz 160MHz (15...219)",
00017    # 6 GHz extensions (IEEE 802.11ax/ay)
00018    129: "6GHz 20MHz (low band)",
00019    130: "6GHz 40MHz (low band)",
00020    131: "6GHz 80MHz (low band)",
00021    132: "6GHz 160MHz (low band)",
00022    # 60 GHz (802.11ad/ay)
00023    180: "60GHz (Channel 1)",
00024    181: "60GHz (Channel 2)",
00025    182: "60GHz (Channel 3)",
00026    183: "60GHz (Channel 4)",
00027 }
```

7.29.1.4 PHY_TYPE_TABLE

```
dict defaults.info.PHY_TYPE_TABLE
```

Initial value:

```
00001 = {
00002     0: "Unknown",
00003     1: "FHSS",
00004     2: "DSSS",
00005     3: "IR Baseband",
00006     4: "OFDM (802.11a/g)",
00007     5: "HR/DSSS (802.11b)",
00008     6: "ERP (802.11g)",
00009     7: "HT (802.11n)",
00010    8: "VHT (802.11ac)",
00011    9: "HE (802.11ax)",
00012   10: "EHT (802.11be)",
00013 }
```

7.30 link_measurement_cmd Namespace Reference

Classes

- class [LinkMeasurementCommandBuilder](#)

7.31 logger Namespace Reference

Classes

- class [LogLevel](#)
- class [Logger](#)

7.32 measurement_parser Namespace Reference

Functions

- Optional[[BeaconMeasurement](#)] `parse_beacon_measurement` (`dot11`)
- Optional[[LinkMeasurement](#)] `parse_link_measurement` (`dot11`)
- Optional[[BSSTransitionResponse](#)] `parse_bss_tm_response` (`dot11`)

7.32.1 Function Documentation

7.32.1.1 `parse_beacon_measurement()`

```
Optional[BeaconMeasurement] measurement_parser.parse_beacon_measurement (
    dot11)
```

Convert a Scapy 802.11k Beacon Report frame into a [BeaconMeasurement](#) object.
 Returns None if the frame is not a Beacon Measurement Report.
 Logs each step for debugging.

7.32.1.2 `parse_bss_tm_response()`

```
Optional[BSSTransitionResponse] measurement_parser.parse_bss_tm_response (
    dot11)
```

Parse an 802.11v BSS Transition Management Response.
 Keeps `Logger.log_info()` calls for full traceability.

7.32.1.3 `parse_link_measurement()`

```
Optional[LinkMeasurement] measurement_parser.parse_link_measurement (
    dot11)
```

Convert a Scapy 802.11k Link Measurement Report frame into a [LinkMeasurement](#) object.
 Returns None if the frame is not a Link Measurement Report.
 Logs each step for debugging.

7.33 metrics Namespace Reference

Namespaces

- namespace [nbranking](#)
- namespace [qoe](#)
- namespace [tm_engine](#)

7.34 metrics.nbranking Namespace Reference

Classes

- class [NeighborRanking](#)

7.35 metrics.qoe Namespace Reference

Classes

- class [QoEComponents](#)
- class [QoEHistory](#)
- class [QoE](#)

7.36 metrics.tm_engine Namespace Reference

Classes

- class [TransitionManagementEngine](#)

Variables

- float [QOE_TRANSITION_THRESHOLD](#) = 0.55

7.36.1 Variable Documentation

7.36.1.1 QOE_TRANSITION_THRESHOLD

```
float metrics.tm_engine.QOE_TRANSITION_THRESHOLD = 0.55
```

7.37 model Namespace Reference

Namespaces

- namespace [ap](#)
- namespace [mac_address](#)
- namespace [measurement](#)
- namespace [neighbor](#)
- namespace [station](#)

7.38 model.ap Namespace Reference

Classes

- class [APStatus](#)
- class [AP](#)

7.39 model.mac_address Namespace Reference

Classes

- class [MacAddress](#)

7.40 model.measurement Namespace Reference

Classes

- class [BeaconReport](#)
- class [BeaconMeasurement](#)
- class [LinkMeasurement](#)
- class [BSSTransitionResponse](#)

7.41 model.neighbor Namespace Reference

Classes

- class [Neighbor](#)

7.42 model.station Namespace Reference

Classes

- class [Station](#)

7.43 neighbor_cmd Namespace Reference

Classes

- class [NeighborCommandBuilder](#)

7.44 neighbor_parser Namespace Reference

Classes

- class [NeighborParser](#)

Functions

- [Neighbor neighbor_from_beacon_report \(BeaconReport br\)](#)

7.44.1 Function Documentation

7.44.1.1 neighbor_from_beacon_report()

```
Neighbor neighbor_parser.neighbor_from_beacon_report (
    BeaconReport br)
```

Convert a BeaconReport into a Neighbor object.
Only fields available from BeaconReport are filled.

7.45 request_beacon_cmd Namespace Reference

Classes

- class [OperatingClass](#)
- class [MeasurementMode](#)
- class [ReqMode](#)
- class [RequestBeaconCommandBuilder](#)

7.46 run_tests Namespace Reference

Functions

- [main \(\)](#)

7.46.1 Function Documentation

7.46.1.1 main()

```
run_tests.main ()
```

7.47 runner Namespace Reference

Functions

- `link_measurement_scheduler (ctrl, StationDB stationDB, LinkMeasurementDB lmrepDB, interval_sec)`
- `beacon_measurement_scheduler (ctrl, StationDB stationDB, neighborDB, BeaconMeasurementDB bmrepDB, interval_sec)`
- `qoe_scheduler (QoE qoe_calc, float interval_sec=5.0)`
- `nranking_scheduler (StationDB stdb, NeighborRankingDB nrdb, BeaconMeasurementDB bmr, NeighborDB ndb, float interval_sec=5.0)`
- `bss_tm_scheduler (Controller controller, float interval_sec=5.0)`
- `accept_thread (SocketPool pool, str name)`
- `server_thread ()`
- `main ()`

7.47.1 Function Documentation

7.47.1.1 accept_thread()

```
runner.accept_thread (
    SocketPool pool,
    str name)
```

Accept incoming connections and track them.

7.47.1.2 beacon_measurement_scheduler()

```
runner.beacon_measurement_scheduler (
    ctrl,
    StationDB stationDB,
    neighborDB,
    BeaconMeasurementDB bmrepDB,
    interval_sec)
```

7.47.1.3 bss_tm_scheduler()

```
runner.bss_tm_scheduler (
    Controller controller,
    float interval_sec = 5.0)
```

7.47.1.4 link_measurement_scheduler()

```
runner.link_measurement_scheduler (
    ctrl,
    StationDB stationDB,
    LinkMeasurementDB lmrepDB,
    interval_sec)
```

7.47.1.5 main()

```
runner.main ()
```

7.47.1.6 nbranking_scheduler()

```
runner.nbranking_scheduler (
    StationDB stdb,
    NeighborRankingDB nrdb,
    BeaconMeasurementDB bmr,
    NeighborDB ndb,
    float interval_sec = 5.0)
```

7.47.1.7 qoe_scheduler()

```
runner.qoe_scheduler (
    QoE qoe_calc,
    float interval_sec = 5.0)
```

7.47.1.8 server_thread()

```
runner.server_thread ()
```

7.48 rmx Namespace Reference

Classes

- class [MgmtType](#)
- class [RxMux](#)

7.49 station_parser Namespace Reference

Classes

- class [StationParser](#)

7.50 store Namespace Reference

Namespaces

- namespace [acceptance](#)
- namespace [routine](#)

7.51 store.acceptance Namespace Reference

Classes

- class [BSSTransitionResponseStatus](#)
- class [BSSTransitionAcceptance](#)

7.52 store.routine Namespace Reference

Classes

- class [Routine](#)

7.53 tests Namespace Reference

Namespaces

- namespace [test_add_neib](#)
- namespace [test_bm](#)
- namespace [test_bss_tm](#)
- namespace [test_lm](#)

7.54 tests.test_add_neib Namespace Reference

Functions

- [test_add_neib \(\)](#)

7.54.1 Function Documentation

7.54.1.1 [test_add_neib\(\)](#)

```
tests.test_add_neib.test_add_neib ()
```

7.55 tests.test_bm Namespace Reference

Functions

- [test_rbm \(\)](#)

7.55.1 Function Documentation

7.55.1.1 test_rbm()

```
tests.test_bm.test_rbm ()
```

7.56 tests.test_bss_tm Namespace Reference

Functions

- [test_bss_tm \(\)](#)

7.56.1 Function Documentation

7.56.1.1 test_bss_tm()

```
tests.test_bss_tm.test_bss_tm ()
```

7.57 tests.test_lm Namespace Reference

Functions

- [test_lm \(\)](#)

7.57.1 Function Documentation

7.57.1.1 test_lm()

```
tests.test_lm.test_lm ()
```


Chapter 8

Class Documentation

8.1 model.ap.AP Class Reference

Public Member Functions

- `__init__(ap)`
- `to_dict(self)`
- `__str__(self)`

8.1.1 Constructor & Destructor Documentation

8.1.1.1 `__init__()`

```
model.ap.AP.__init__ (  
    ap)
```

8.1.2 Member Function Documentation

8.1.2.1 `__str__()`

```
model.ap.AP.__str__ (  
    self)
```

8.1.2.2 `to_dict()`

```
model.ap.AP.to_dict (  
    self)
```

Dump the complete state of the AP.
Returns a dictionary of all AP attributes.

The documentation for this class was generated from the following file:

- `model/ap.py`

8.2 ap_parser.APParser Class Reference

Public Member Functions

- [parse_status \(AP ap, str content\)](#)

Static Public Member Functions

- [from_content \(str content\)](#)
- [list decode_supported_rates \(rate_hex_str\)](#)

Static Protected Member Functions

- [_convert_value \(ap, str value\)](#)

8.2.1 Member Function Documentation

8.2.1.1 [_convert_value\(\)](#)

```
ap_parser.APParser._convert_value (
    ap,
    str value)  [static], [protected]
```

Convert string value to appropriate type (int, hex, None, or string).

8.2.1.2 [decode_supported_rates\(\)](#)

```
list ap_parser.APParser.decode_supported_rates (
    rate_hex_str)  [static]
```

Convert the supported rate hex string into Mbps list

8.2.1.3 [from_content\(\)](#)

```
ap_parser.APParser.from_content (
    str content)  [static]
```

8.2.1.4 [parse_status\(\)](#)

```
ap_parser.APParser.parse_status (
    AP ap,
    str content)
```

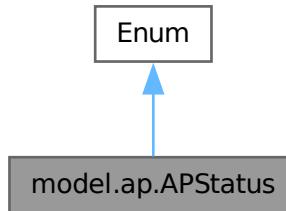
Parse status content from hostapd in key=value format.

The documentation for this class was generated from the following file:

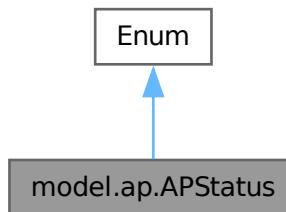
- [parser/ap_parser.py](#)

8.3 model.ap.APStatus Class Reference

Inheritance diagram for model.ap.APStatus:



Collaboration diagram for model.ap.APStatus:



Static Public Attributes

- int [AP_ENABLED](#) = 1
- int [AP_DISABLED](#) = 0

8.3.1 Member Data Documentation

8.3.1.1 AP_DISABLED

```
int model.ap.APStatus.AP_DISABLED = 0 [static]
```

8.3.1.2 AP_ENABLED

```
int model.ap.APStatus.AP_ENABLED = 1 [static]
```

The documentation for this class was generated from the following file:

- [model/ap.py](#)

8.4 basics.BasicCommand Class Reference

Public Member Functions

- str [status \(\)](#)

Static Public Member Functions

- str [enable \(\)](#)
- str [disable \(\)](#)
- str [station_info \(str mac\)](#)
- str [first_station \(\)](#)
- str [next_station \(str mac\)](#)
- str [chan_switch \(int beacon_interv, WiFi24GHZChannels freq\)](#)
- str [show_neighbor \(\)](#)
- str [remove_neighbor \(str bssid\)](#)
- str [reload_config \(\)](#)
- str [reload \(\)](#)

8.4.1 Member Function Documentation

8.4.1.1 chan_switch()

```
str basics.BasicCommand.chan_switch (
    int beacon_interv,
    WiFi24GHZChannels freq) [static]
```

8.4.1.2 disable()

```
str basics.BasicCommand.disable () [static]
```

8.4.1.3 enable()

```
str basics.BasicCommand.enable () [static]
```

8.4.1.4 first_station()

```
str basics.BasicCommand.first_station () [static]
```

8.4.1.5 next_station()

```
str basics.BasicCommand.next_station (
    str mac) [static]
```

8.4.1.6 reload()

```
str basics.BasicCommand.reload () [static]
```

8.4.1.7 reload_config()

```
str basics.BasicCommand.reload_config () [static]
```

8.4.1.8 remove_neighbor()

```
str basics.BasicCommand.remove_neighbor (
    str bssid) [static]
```

8.4.1.9 show_neighbor()

```
str basics.BasicCommand.show_neighbor () [static]
```

8.4.1.10 station_info()

```
str basics.BasicCommand.station_info (
    str mac) [static]
```

8.4.1.11 status()

```
str basics.BasicCommand.status ()
```

The documentation for this class was generated from the following file:

- command/[basics.py](#)

8.5 model.measurement.BeaconMeasurement Class Reference

Public Member Functions

- [__post_init__](#) (self)
- dict [to_dict](#) (self)

Static Public Member Functions

- "BeaconMeasurement" [from_bytes](#) (bytes bts, str sta_mac=None)

Static Public Attributes

- Optional `sta_mac` = None
- int `measurement_token` = None
- int `dialog_token` = None
- List `beacon_reports` = None

8.5.1 Member Function Documentation

8.5.1.1 `__post_init__()`

```
model.measurement.BeaconMeasurement.__post_init__ (
    self)
```

8.5.1.2 `from_bytes()`

```
"BeaconMeasurement" model.measurement.BeaconMeasurement.from_bytes (
    bytes bts,
    str  sta_mac = None)  [static]
```

8.5.1.3 `to_dict()`

```
dict model.measurement.BeaconMeasurement.to_dict (
    self)
```

Dump the complete state of the BeaconMeasurement.

8.5.2 Member Data Documentation

8.5.2.1 `beacon_reports`

```
List model.measurement.BeaconMeasurement.beacon_reports = None  [static]
```

8.5.2.2 `dialog_token`

```
model.measurement.BeaconMeasurement.dialog_token = None  [static]
```

8.5.2.3 `measurement_token`

```
model.measurement.BeaconMeasurement.measurement_token = None  [static]
```

8.5.2.4 sta_mac

```
model.measurement.BeaconMeasurement.sta_mac = None [static]
```

The documentation for this class was generated from the following file:

- [model/measurement.py](#)

8.6 dashboard.bmrep_dashboard.BeaconMeasurementDashboard Class Reference

Public Member Functions

- [__init__](#) (self, [BeaconMeasurementDB](#) bm_db)
- [str as_table](#) (self, [Optional\[str\]](#) sort_by="rcpi", [Optional\[int\]](#) limit=None)
- [show](#) (self, [Optional\[str\]](#) sort_by="rcpi", [Optional\[int\]](#) limit=None, [Optional\[IO\]](#) pipe=None, [bool](#) replace=False)

Public Attributes

- [db](#) = bm_db

8.6.1 Detailed Description

Prettier, tabulated display of current BeaconMeasurementDB contents.

8.6.2 Constructor & Destructor Documentation

8.6.2.1 __init__()

```
dashboard.bmrep_dashboard.BeaconMeasurementDashboard.__init__ (
    self,
    BeaconMeasurementDB bm_db)
```

8.6.3 Member Function Documentation

8.6.3.1 as_table()

```
str dashboard.bmrep_dashboard.BeaconMeasurementDashboard.as_table (
    self,
    Optional\[str\] sort_by = "rcpi",
    Optional\[int\] limit = None)
```

8.6.3.2 show()

```
dashboard.bmrep_dashboard.BeaconMeasurementDashboard.show (
    self,
    Optional[str] sort_by = "rcpi",
    Optional[int] limit = None,
    Optional[IO] pipe = None,
    bool replace = False)
```

8.6.4 Member Data Documentation

8.6.4.1 db

dashboard.bmrep_dashboard.BeaconMeasurementDashboard.db = bm_db

The documentation for this class was generated from the following file:

- dashboard/bmrep_dashboard.py

8.7 db.bmrep_db.BeaconMeasurementDB Class Reference

Public Member Functions

- `__new__` (cls)
- `__init__` (self)
- `add` (self, BeaconMeasurement bm, Optional[str] sta_mac=None)
- `list[BeaconMeasurement] get` (self, Optional[str] sta_mac=None)
- `Dict[str, list[BeaconMeasurement]] all` (self)
- `Dict[str, list[BeaconMeasurement]] raw` (self)
- `Dict[str, list[dict]] to_dict` (self)
- `remove` (self, Optional[str] sta_mac=None)
- `clear` (self, Optional[str] sta_mac=None)
- `bool is_expired` (self, float ts)
- `int count` (self, Optional[str] sta_mac=None)
- `bool __contains__` (self, str sta_mac)
- `__len__` (self)
- `__repr__` (self)

Protected Attributes

- dict `_store` = {}
- bool `_initialized` = True

Static Protected Attributes

- `_instance` = None
- `_lock` = RLock()

8.7.1 Detailed Description

BeaconMeasurement DB with soft expiration.
Internally stores timestamps, but all public access returns the old format.

8.7.2 Constructor & Destructor Documentation

8.7.2.1 `__init__()`

```
db.bmrep_db.BeaconMeasurementDB.__init__ (
    self)
```

8.7.3 Member Function Documentation

8.7.3.1 `__contains__()`

```
bool db.bmrep_db.BeaconMeasurementDB.__contains__ (
    self,
    str sta_mac)
```

8.7.3.2 `__len__()`

```
db.bmrep_db.BeaconMeasurementDB.__len__ (
    self)
```

8.7.3.3 `__new__()`

```
db.bmrep_db.BeaconMeasurementDB.__new__ (
    cls)
```

8.7.3.4 `__repr__()`

```
db.bmrep_db.BeaconMeasurementDB.__repr__ (
    self)
```

8.7.3.5 `add()`

```
db.bmrep_db.BeaconMeasurementDB.add (
    self,
    BeaconMeasurement bm,
    Optional[str] sta_mac = None)
```

8.7.3.6 all()

```
Dict[str, list[BeaconMeasurement]] db.bmrep_db.BeaconMeasurementDB.all (
    self)
```

8.7.3.7 clear()

```
db.bmrep_db.BeaconMeasurementDB.clear (
    self,
    Optional[str] sta_mac = None)
```

8.7.3.8 count()

```
int db.bmrep_db.BeaconMeasurementDB.count (
    self,
    Optional[str] sta_mac = None)
```

8.7.3.9 get()

```
list[BeaconMeasurement] db.bmrep_db.BeaconMeasurementDB.get (
    self,
    Optional[str] sta_mac = None)
```

8.7.3.10 is_expired()

```
bool db.bmrep_db.BeaconMeasurementDB.is_expired (
    self,
    float ts)
```

Check if the provided timestamp is expired based on EXPIRE_SEC.

Args:

ts (float): Timestamp to check.

Returns:

bool: True if the timestamp is expired, False otherwise.

8.7.3.11 raw()

```
Dict[str, list[BeaconMeasurement]] db.bmrep_db.BeaconMeasurementDB.raw (
    self)
```

8.7.3.12 remove()

```
db.bmrep_db.BeaconMeasurementDB.remove (
    self,
    Optional[str] sta_mac = None)
```

8.7.3.13 to_dict()

```
Dict[str, list[dict]] db.bmrep_db.BeaconMeasurementDB.to_dict (
    self)
```

Return the complete state of the database, omitting timestamps.
Keys are station MAC addresses; values are lists of measurements (as dicts if possible, else repr()).

8.7.4 Member Data Documentation

8.7.4.1 _initialized

```
bool db.bmrep_db.BeaconMeasurementDB._initialized = True [protected]
```

8.7.4.2 _instance

```
db.bmrep_db.BeaconMeasurementDB._instance = None [static], [protected]
```

8.7.4.3 _lock

```
db.bmrep_db.BeaconMeasurementDB._lock = RLock() [static], [protected]
```

8.7.4.4 _store

```
dict db.bmrep_db.BeaconMeasurementDB._store = {} [protected]
```

The documentation for this class was generated from the following file:

- db/bmrep_db.py

8.8 model.measurement.BeaconReport Class Reference

Public Member Functions

- float [rss_i_dbm](#) (self)
- float [snr_db](#) (self)
- Optional[str] [parse_ssid](#) (self)
- dict [to_dict](#) (self)

Public Attributes

- `operating_class`
- `channel_number`
- `measurement_start_time`
- `measurement_duration`
- `reported_frame_info`
- `rcpi`
- `rsni`
- `bssid`
- `antenna_id`
- `parent_tsf`
- `rssi_dbm`
- `snr_db`

Static Public Attributes

- Optional `reported_frame_body` = None
- Optional `ssid` = None

8.8.1 Member Function Documentation

8.8.1.1 `parse_ssid()`

```
Optional[str] model.measurement.BeaconReport.parse_ssid (
    self)
```

8.8.1.2 `rssi_dbm()`

```
float model.measurement.BeaconReport.rssi_dbm (
    self)
```

8.8.1.3 `snr_db()`

```
float model.measurement.BeaconReport.snr_db (
    self)
```

8.8.1.4 `to_dict()`

```
dict model.measurement.BeaconReport.to_dict (
    self)
```

Dump the complete state of the BeaconReport.

8.8.2 Member Data Documentation

8.8.2.1 antenna_id

```
model.measurement.BeaconReport.antenna_id
```

8.8.2.2 bssid

```
model.measurement.BeaconReport.bssid
```

8.8.2.3 channel_number

```
model.measurement.BeaconReport.channel_number
```

8.8.2.4 measurement_duration

```
model.measurement.BeaconReport.measurement_duration
```

8.8.2.5 measurement_start_time

```
model.measurement.BeaconReport.measurement_start_time
```

8.8.2.6 operating_class

```
model.measurement.BeaconReport.operating_class
```

8.8.2.7 parent_tsf

```
model.measurement.BeaconReport.parent_tsf
```

8.8.2.8 rcpi

```
model.measurement.BeaconReport.rcpi
```

8.8.2.9 reported_frame_body

```
model.measurement.BeaconReport.reported_frame_body = None [static]
```

8.8.2.10 reported_frame_info

```
model.measurement.BeaconReport.reported_frame_info
```

8.8.2.11 rsni

```
model.measurement.BeaconReport.rsni
```

8.8.2.12 rssi_dbm

```
model.measurement.BeaconReport.rssi_dbm
```

8.8.2.13 snr_db

```
model.measurement.BeaconReport.snr_db
```

8.8.2.14 ssid

```
model.measurement.BeaconReport.ssid = None [static]
```

The documentation for this class was generated from the following file:

- [model/measurement.py](#)

8.9 bss_tm_cmd.BssTmRequestBuilder Class Reference

Public Member Functions

- [`__init__`](#) (self, str `sta_addr`, `ReqMode req_mode`, Optional[int] `disassoc_timer`=None, Optional[int] `validity_interval`=None, Optional[List["Neighbor"]] `neighbors`=None, Optional[int] `dialog_token`=None)
- [`str build`](#) (self)
- [`__str__`](#) (self)

Public Attributes

- `sta_addr` = `sta_addr`
- `req_mode` = `req_mode`
- `disassoc_timer` = `disassoc_timer`
- `validity_interval` = `validity_interval`
- `neighbors` = `neighbors` or []
- `dialog_token` = `dialog_token`

Static Protected Member Functions

- [`str _encode_neighbor`](#) ("Neighbor" n)

8.9.1 Detailed Description

Builds a BSS Transition Management Request (BSS_TM_REQ) command for hostapd_cli.
Supports multiple neighbors.

8.9.2 Constructor & Destructor Documentation

8.9.2.1 __init__()

```
bss_tm_cmd.BssTmRequestBuilder.__init__ (
    self,
    str sta_addr,
    ReqMode req_mode,
    Optional[int] disassoc_timer = None,
    Optional[int] validity_interval = None,
    Optional[List["Neighbor"]] neighbors = None,
    Optional[int] dialog_token = None)
```

8.9.3 Member Function Documentation

8.9.3.1 __str__()

```
bss_tm_cmd.BssTmRequestBuilder.__str__ (
    self)
```

8.9.3.2 _encode_neighbor()

```
str bss_tm_cmd.BssTmRequestBuilder._encode_neighbor (
    "Neighbor" n) [static], [protected]
```

Encode Neighbor instance into Neighbor Report hex.

8.9.3.3 build()

```
str bss_tm_cmd.BssTmRequestBuilder.build (
    self)
```

Build full hostapd_cli BSS_TM_REQ command string.

8.9.4 Member Data Documentation

8.9.4.1 dialog_token

```
bss_tm_cmd.BssTmRequestBuilder.dialog_token = dialog_token
```

8.9.4.2 disassoc_timer

```
bss_tm_cmd.BssTmRequestBuilder.disassoc_timer = disassoc_timer
```

8.9.4.3 neighbors

```
bss_tm_cmd.BssTmRequestBuilder.neighbors = neighbors or [ ]
```

8.9.4.4 req_mode

```
bss_tm_cmd.BssTmRequestBuilder.req_mode = req_mode
```

8.9.4.5 sta_addr

```
bss_tm_cmd.BssTmRequestBuilder.sta_addr = sta_addr
```

8.9.4.6 validity_interval

```
bss_tm_cmd.BssTmRequestBuilder.validity_interval = validity_interval
```

The documentation for this class was generated from the following file:

- command/[bss_tm_cmd.py](#)

8.10 store.acceptance.BSSTransitionAcceptance Class Reference

Public Member Functions

- [__new__](#) (cls, Optional[str] [persist_path](#)=None)
- None [__init__](#) (self, Optional[str] [persist_path](#)=None)
- None [add](#) (self, [MacAddress](#) mac, int status)
- List[int] [get](#) (self, [MacAddress](#) mac)
- Dict[str, List[int]] [to_dict](#) (self)
- None [save](#) (self, Optional[str] path=None)
- None [load](#) (self, Optional[str] path=None)
- [__len__](#) (self)
- bool [__contains__](#) (self, [MacAddress](#) mac)
- List[int] [__getitem__](#) (self, [MacAddress](#) mac)
- [__repr__](#) (self)

Public Attributes

- Dict[str, List[int]] [info](#) = dict()
- str [persist_path](#) = persist_path or "bss_transition_acceptance.json"

Protected Member Functions

- None `_save` (self, Optional[str] path=None)
- None `_load` (self, Optional[str] path=None)

Protected Attributes

- `_lock` = threading.Lock()
- bool `_initialized` = True

Static Protected Attributes

- `_instance` = None
- `_instance_lock` = threading.Lock()

8.10.1 Detailed Description

Singleton class that accepts and persists BSS Transition response statuses for each station.

8.10.2 Constructor & Destructor Documentation

8.10.2.1 `__init__()`

```
None store.acceptance.BSSTransitionAcceptance.__init__ (
    self,
    Optional[str] persist_path = None)
```

8.10.3 Member Function Documentation

8.10.3.1 `__contains__()`

```
bool store.acceptance.BSSTransitionAcceptance.__contains__ (
    self,
    MacAddress mac)
```

8.10.3.2 `__getitem__()`

```
List[int] store.acceptance.BSSTransitionAcceptance.__getitem__ (
    self,
    MacAddress mac)
```

8.10.3.3 `__len__()`

```
store.acceptance.BSSTransitionAcceptance.__len__ (
    self)
```

8.10.3.4 `__new__()`

```
store.acceptance.BSSTransitionAcceptance.__new__ (
    cls,
    Optional[str] persist_path = None)
```

8.10.3.5 `__repr__()`

```
store.acceptance.BSSTransitionAcceptance.__repr__ (
    self)
```

8.10.3.6 `_load()`

```
None store.acceptance.BSSTransitionAcceptance._load (
    self,
    Optional[str] path = None) [protected]
```

Internal, thread-safe load-from-path.

8.10.3.7 `_save()`

```
None store.acceptance.BSSTransitionAcceptance._save (
    self,
    Optional[str] path = None) [protected]
```

Internal, thread-safe save-to-path.

8.10.3.8 `add()`

```
None store.acceptance.BSSTransitionAcceptance.add (
    self,
    MacAddress mac,
    int status)
```

Add a response status for a MAC. Will also persist immediately (incremental persistence).

Args:

- mac: MacAddress (object or string)
- status: BSSTransitionResponseStatus

8.10.3.9 `get()`

```
List[int] store.acceptance.BSSTransitionAcceptance.get (
    self,
    MacAddress mac)
```

Get the list of response statuses for a MAC address.

Returns: List of BSSTransitionResponseStatus

8.10.3.10 load()

```
None store.acceptance.BSSTransitionAcceptance.load (
    self,
    Optional[str] path = None)
```

Manually reload from file.

8.10.3.11 save()

```
None store.acceptance.BSSTransitionAcceptance.save (
    self,
    Optional[str] path = None)
```

Save the current info dict to file, overwriting it.

8.10.3.12 to_dict()

```
Dict[str, List[int]] store.acceptance.BSSTransitionAcceptance.to_dict (
    self)
```

Return the full mapping mac->list-of-status as JSON-serializable dict.

8.10.4 Member Data Documentation

8.10.4.1 __initialized

```
bool store.acceptance.BSSTransitionAcceptance.__initialized = True [protected]
```

8.10.4.2 __instance

```
store.acceptance.BSSTransitionAcceptance.__instance = None [static], [protected]
```

8.10.4.3 __instance_lock

```
store.acceptance.BSSTransitionAcceptance.__instance_lock = threading.Lock() [static], [protected]
```

8.10.4.4 __lock

```
store.acceptance.BSSTransitionAcceptance.__lock = threading.Lock() [protected]
```

8.10.4.5 info

```
store.acceptance.BSSTransitionAcceptance.info = dict()
```

8.10.4.6 persist_path

```
str store.acceptance.BSSTransitionAcceptance.persist_path = persist_path or "bss_transition_←  
acceptance.json"
```

The documentation for this class was generated from the following file:

- [store/acceptance.py](#)

8.11 model.measurement.BSSTransitionResponse Class Reference

Public Member Functions

- bool [accepted](#) (self)
- bool [rejected](#) (self)
- bool [has_candidates](#) (self)
- bool [has_vendor_extensions](#) (self)
- bool [termination_imminent](#) (self)
- dict [to_dict](#) (self)
- [__repr__](#) (self)

Public Attributes

- int [status_code](#) = 0
- [dialog_token](#)
- [accepted](#)
- [rejected](#)
- [has_candidates](#)
- [has_vendor_extensions](#)
- [termination_imminent](#)

Static Public Attributes

- int [bss_termination_delay](#) = 0
- Optional [target_bssid](#) = None
- List [candidate_list](#) = field(default_factory=list)
- List [neighbor_reports](#) = field(default_factory=list)
- List [vendor_ies](#) = field(default_factory=list)
- List [extra_ies](#) = field(default_factory=list)

8.11.1 Detailed Description

Parsed representation of an 802.11v BSS Transition Management Response
(Action Code = 8 under WNM category 10).

8.11.2 Member Function Documentation

8.11.2.1 __repr__()

```
model.measurement.BSSTransitionResponse.__repr__ (
    self)
```

8.11.2.2 accepted()

```
bool model.measurement.BSSTransitionResponse.accepted (
    self)
```

True if the STA accepted the BSS transition suggestion.

8.11.2.3 has_candidates()

```
bool model.measurement.BSSTransitionResponse.has_candidates (
    self)
```

Whether the response contains any candidate BSS entries.

8.11.2.4 has_vendor_extensions()

```
bool model.measurement.BSSTransitionResponse.has_vendor_extensions (
    self)
```

8.11.2.5 rejected()

```
bool model.measurement.BSSTransitionResponse.rejected (
    self)
```

8.11.2.6 termination_imminent()

```
bool model.measurement.BSSTransitionResponse.termination_imminent (
    self)
```

Non-zero termination delay means AP plans to disassociate soon.

8.11.2.7 to_dict()

```
dict model.measurement.BSSTransitionResponse.to_dict (
    self)
```

Dump the complete state of the BSSTransitionResponse.

8.11.3 Member Data Documentation

8.11.3.1 accepted

```
model.measurement.BSSTransitionResponse.accepted
```

8.11.3.2 bss_termination_delay

```
model.measurement.BSSTransitionResponse.bss_termination_delay = 0 [static]
```

8.11.3.3 candidate_list

```
model.measurement.BSSTransitionResponse.candidate_list = field(default_factory=list) [static]
```

8.11.3.4 dialog_token

```
model.measurement.BSSTransitionResponse.dialog_token
```

8.11.3.5 extra_ies

```
model.measurement.BSSTransitionResponse.extra_ies = field(default_factory=list) [static]
```

8.11.3.6 has_candidates

```
model.measurement.BSSTransitionResponse.has_candidates
```

8.11.3.7 has_vendor_extensions

```
model.measurement.BSSTransitionResponse.has_vendor_extensions
```

8.11.3.8 neighbor_reports

```
model.measurement.BSSTransitionResponse.neighbor_reports = field(default_factory=list) [static]
```

8.11.3.9 rejected

```
model.measurement.BSSTransitionResponse.rejected
```

8.11.3.10 status_code

```
model.measurement.BSSTransitionResponse.status_code = 0
```

8.11.3.11 target_bssid

```
model.measurement.BSSTransitionResponse.target_bssid = None [static]
```

8.11.3.12 termination_imminent

```
model.measurement.BSSTransitionResponse.termination_imminent
```

8.11.3.13 vendor_ies

```
model.measurement.BSSTransitionResponse.vendor_ies = field(default_factory=list) [static]
```

The documentation for this class was generated from the following file:

- [model/measurement.py](#)

8.12 dashboard.bsstm_dashboard.BSSTransitionResponseDashboard Class Reference

Public Member Functions

- [__init__ \(self, BSSTransitionResponseDB db\)](#)
- [str as_table \(self, Optional\[str\] sort_by="dialog_token", Optional\[int\] limit=None\)](#)
- [show \(self, Optional\[str\] sort_by="dialog_token", Optional\[int\] limit=None, Optional\[IO\] pipe=None, bool replace=False\)](#)

Public Attributes

- [db = db](#)

8.12.1 Detailed Description

Prettier, boxed/tabulated display of current BSSTransitionResponseDB contents.

8.12.2 Constructor & Destructor Documentation

8.12.2.1 __init__()

```
dashboard.bsstm_dashboard.BSSTransitionResponseDashboard.__init__ (
    self,
    BSSTransitionResponseDB db)
```

8.12.3 Member Function Documentation

8.12.3.1 as_table()

```
str dashboard.bsstm_dashboard.BSSTransitionResponseDashboard.as_table (
    self,
    Optional[str] sort_by = "dialog_token",
    Optional[int] limit = None)
```

8.12.3.2 show()

```
dashboard.bsstm_dashboard.BSSTransitionResponseDashboard.show (
    self,
    Optional[str] sort_by = "dialog_token",
    Optional[int] limit = None,
    Optional[IO] pipe = None,
    bool replace = False)
```

8.12.4 Member Data Documentation

8.12.4.1 db

```
dashboard.bsstm_dashboard.BSSTransitionResponseDashboard.db = db
```

The documentation for this class was generated from the following file:

- [dashboard/bstm_dashboard.py](#)

8.13 db.bsstm_db.BSSTransitionResponseDB Class Reference

Public Member Functions

- [__new__\(cls\)](#)
- [__init__\(self, Optional\[str\] filename=None\)](#)
- [add\(self, "BSSTransitionResponse" resp, Optional\[str\] sta_mac=None\)](#)
- [remove\(self, int dialog_token, Optional\[str\] sta_mac=None\)](#)
- [Optional\["BSSTransitionResponse"\] get\(self, int dialog_token, Optional\[str\] sta_mac=None\)](#)
- [List\["BSSTransitionResponse"\] all_for_sta\(self, Optional\[str\] sta_mac=None\)](#)
- [Dict\[str, List\["BSSTransitionResponse"\]\] all\(self\)](#)
- [int count\(self, Optional\[str\] sta_mac=None\)](#)
- [clear\(self, Optional\[str\] sta_mac=None\)](#)
- [bool __contains__\(self, str sta_mac\)](#)
- [__len__\(self\)](#)
- [__iter__\(self\)](#)
- [to_dict\(self\)](#)
- [__repr__\(self\)](#)

Public Attributes

- `filename` = filename
- `acceptance` = `BSSTransitionAcceptance(self.filename)`

Protected Attributes

- dict `_db` = {}
- bool `_initialized` = True

Static Protected Attributes

- `_instance` = None
- `_lock` = RLock()

8.13.1 Detailed Description

Database for storing BSSTransitionResponse reports per station.

8.13.2 Constructor & Destructor Documentation

8.13.2.1 `__init__()`

```
db.bsstm_db.BSSTransitionResponseDB.__init__ (
    self,
    Optional[str]  filename = None)
```

8.13.3 Member Function Documentation

8.13.3.1 `__contains__()`

```
bool db.bsstm_db.BSSTransitionResponseDB.__contains__ (
    self,
    str sta_mac)
```

8.13.3.2 `__iter__()`

```
db.bsstm_db.BSSTransitionResponseDB.__iter__ (
    self)
```

Iterate over all BSS Transition responses (flattened).

8.13.3.3 `__len__()`

```
db.bsstm_db.BSSTransitionResponseDB.__len__ (
    self)
```

8.13.3.4 `__new__(cls)`

```
db.bsstm_db.BSSTransitionResponseDB.__new__ (
    cls)
```

8.13.3.5 `__repr__(self)`

```
db.bsstm_db.BSSTransitionResponseDB.__repr__ (
    self)
```

8.13.3.6 `add(self, resp, sta_mac = None)`

```
db.bsstm_db.BSSTransitionResponseDB.add (
    self,
    "BSSTransitionResponse" resp,
    Optional[str] sta_mac = None)
```

8.13.3.7 `all(self)`

```
Dict[str, List["BSSTransitionResponse"]] db.bsstm_db.BSSTransitionResponseDB.all (
    self)
```

8.13.3.8 `all_for_sta(self, sta_mac = None)`

```
List["BSSTransitionResponse"] db.bsstm_db.BSSTransitionResponseDB.all_for_sta (
    self,
    Optional[str] sta_mac = None)
```

8.13.3.9 `clear(self, sta_mac = None)`

```
db.bsstm_db.BSSTransitionResponseDB.clear (
    self,
    Optional[str] sta_mac = None)
```

8.13.3.10 `count(self, sta_mac = None)`

```
int db.bsstm_db.BSSTransitionResponseDB.count (
    self,
    Optional[str] sta_mac = None)
```

8.13.3.11 get()

```
Optional["BSSTransitionResponse"] db.bsstm_db.BSSTransitionResponseDB.get (
    self,
    int dialog_token,
    Optional[str] sta_mac = None)
```

8.13.3.12 remove()

```
db.bsstm_db.BSSTransitionResponseDB.remove (
    self,
    int dialog_token,
    Optional[str] sta_mac = None)
```

8.13.3.13 to_dict()

```
db.bsstm_db.BSSTransitionResponseDB.to_dict (
    self)
```

Export as nested dict: sta_mac -> dialog_token -> dict.

8.13.4 Member Data Documentation

8.13.4.1 _db

```
dict db.bsstm_db.BSSTransitionResponseDB._db = {} [protected]
```

8.13.4.2 _initialized

```
bool db.bsstm_db.BSSTransitionResponseDB._initialized = True [protected]
```

8.13.4.3 _instance

```
db.bsstm_db.BSSTransitionResponseDB._instance = None [static], [protected]
```

8.13.4.4 _lock

```
db.bsstm_db.BSSTransitionResponseDB._lock = RLock() [static], [protected]
```

8.13.4.5 acceptance

```
db.bsstm_db.BSSTransitionResponseDB.acceptance = BSSTransitionAcceptance(self.filename)
```

8.13.4.6 filename

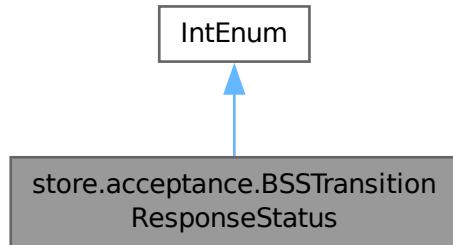
```
db.bsstm_db.BSSTransitionResponseDB.filename = filename
```

The documentation for this class was generated from the following file:

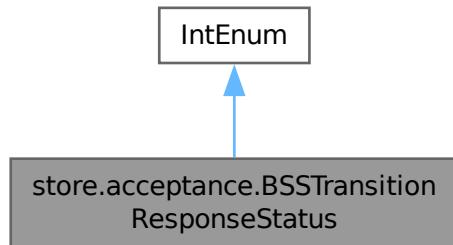
- db/[bsstm_db.py](#)

8.14 store.acceptance.BSSTransitionResponseStatus Class Reference

Inheritance diagram for store.acceptance.BSSTransitionResponseStatus:



Collaboration diagram for store.acceptance.BSSTransitionResponseStatus:



Public Member Functions

- str [description](#) (self)

Static Public Attributes

- int ACCEPTED = 0
- int REJECT_UNSPECIFIED = 1
- int REJECT_TS_DELAY_TOO_SHORT = 2
- int REJECT_STA_POLICY = 3
- int REJECT_AP_POLICY = 4
- int REJECT_STA_BUSY = 5
- int REJECT_INSUFFICIENT_RESOURCES = 6
- int REJECT_OTHER = 7

8.14.1 Member Function Documentation

8.14.1.1 description()

```
str store.acceptance.BSSTransitionResponseStatus.description (
    self)
```

Return a human-readable description of the status.

8.14.2 Member Data Documentation

8.14.2.1 ACCEPTED

```
int store.acceptance.BSSTransitionResponseStatus.ACCEPTED = 0 [static]
```

8.14.2.2 REJECT_AP_POLICY

```
int store.acceptance.BSSTransitionResponseStatus.REJECT_AP_POLICY = 4 [static]
```

8.14.2.3 REJECT_INSUFFICIENT_RESOURCES

```
int store.acceptance.BSSTransitionResponseStatus.REJECT_INSUFFICIENT_RESOURCES = 6 [static]
```

8.14.2.4 REJECT_OTHER

```
int store.acceptance.BSSTransitionResponseStatus.REJECT_OTHER = 7 [static]
```

8.14.2.5 REJECT_STA_BUSY

```
int store.acceptance.BSSTransitionResponseStatus.REJECT_STA_BUSY = 5 [static]
```

8.14.2.6 REJECT_STA_POLICY

```
int store.acceptance.BSSTransitionResponseStatus.REJECT_STA_POLICY = 3 [static]
```

8.14.2.7 REJECT_TS_DELAY_TOO_SHORT

```
int store.acceptance.BSSTransitionResponseStatus.REJECT_TS_DELAY_TOO_SHORT = 2 [static]
```

8.14.2.8 REJECT_UNSPECIFIED

```
int store.acceptance.BSSTransitionResponseStatus.REJECT_UNSPECIFIED = 1 [static]
```

The documentation for this class was generated from the following file:

- [store/acceptance.py](#)

8.15 dashboard.socket_pool.ClientConnection Class Reference

Public Member Functions

- [close \(self\)](#)

Static Public Attributes

- socket [conn .socket](#)

8.15.1 Detailed Description

Represents a connected client.

8.15.2 Member Function Documentation

8.15.2.1 close()

```
dashboard.socket_pool.ClientConnection.close (
    self)
```

8.15.3 Member Data Documentation

8.15.3.1 conn

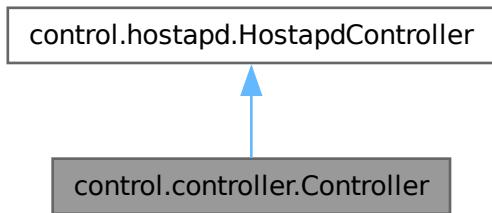
```
socket dashboard.socket_pool.ClientConnection.conn .socket [static]
```

The documentation for this class was generated from the following file:

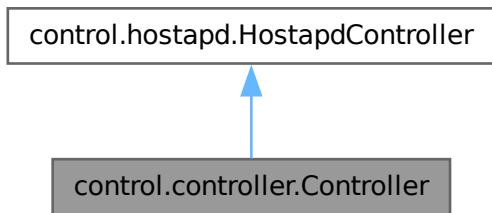
- [dashboard/socket_pool.py](#)

8.16 control.controller.Controller Class Reference

Inheritance diagram for control.controller.Controller:



Collaboration diagram for control.controller.Controller:



Public Member Functions

- `__init__(self, ctrl_path="/var/run/hostapd/wlan0", iface="wlan0", RxMux rxmux=None)`
- `enable(self)`
- `disable(self)`
- `restart(self)`
- `int get_stations(self, StationDB stdb)`
- `int get_neighbors(self, NeighborDB ndb)`
- `add_neighbor(self, NeighborCommandBuilder neib)`
- `bool remove_neighbor(self, str bssid)`
- `req_link_measurement(self, LinkMeasurementCommandBuilder lm)`
- `req_beacon_measurement(self, RequestBeaconCommandBuilder rbm)`
- `bool req_bss_tm(self, BssTmRequestBuilder rbtm)`

Public Member Functions inherited from [control.hostapd.HostapdController](#)

- [__init__](#) (self, `ctrl_path`="/var/run/hostapd/wlan0", `iface`="wlan0", `RxMux rxmux=None`)
- [connect](#) (self)
- [start_read](#) (self)
- [stop_read](#) (self)
- [disconnect](#) (self)
- [bool send_command](#) (self, cmd, timeout=3.0)
- [str|None receive](#) (self, timeout=3.0)
- [str|None receive_event](#) (self, timeout=3.0)
- [bool handle_rx_msg](#) (self, str msg)
- [clear_reply](#) (self)
- [clear_events](#) (self)
- [repl](#) (self)

Static Protected Member Functions

- [bool _event_enabled](#) (str e)
- [bool _event_disabled](#) (str e)
- [bool _check_beacon_req_ack](#) (msg)

Additional Inherited Members

Public Attributes inherited from [control.hostapd.HostapdController](#)

- `ctrl_path` = ctrl_path
- `iface` = iface
- `sock` = None
- `str local_path` = f"/tmp/hostapd_ctrl_{os.getpid()}"
- `Optional[RxMux] rxmux` = rxmux
- `last_cmd_status` = LastCommandStatus.NOINIT

Protected Member Functions inherited from [control.hostapd.HostapdController](#)

- [_reader_loop](#) (self)

Protected Attributes inherited from [control.hostapd.HostapdController](#)

- `_event_queue` = queue.Queue()
- `_reply_queue` = queue.Queue()
- `_reader_thread` = None
- `bool _running` = False

8.16.1 Constructor & Destructor Documentation

8.16.1.1 [__init__\(\)](#)

```
control.controller.Controller.__init__ (
    self,
    ctrl_path = "/var/run/hostapd/wlan0",
    iface = "wlan0",
    RxMux rxmux = None)
```

8.16.2 Member Function Documentation

8.16.2.1 `_check_beacon_req_ack()`

```
bool control.controller.Controller._check_beacon_req_ack (
    msg) [static], [protected]
```

8.16.2.2 `_event_disabled()`

```
bool control.controller.Controller._event_disabled (
    str e) [static], [protected]
```

8.16.2.3 `_event_enabled()`

```
bool control.controller.Controller._event_enabled (
    str e) [static], [protected]
```

8.16.2.4 `add_neighbor()`

```
control.controller.Controller.add_neighbor (
    self,
    NeighborCommandBuilder neib)
```

8.16.2.5 `disable()`

```
control.controller.Controller.disable (
    self)
```

8.16.2.6 `enable()`

```
control.controller.Controller.enable (
    self)
```

8.16.2.7 `get_neighbors()`

```
int control.controller.Controller.get_neighbors (
    self,
    NeighborDB ndb)
```

8.16.2.8 `get_stations()`

```
int control.controller.Controller.get_stations (
    self,
    StationDB stdb)
```

8.16.2.9 remove_neighbor()

```
bool control.controller.Controller.remove_neighbor (
    self,
    str bssid)
```

8.16.2.10 req_beacon_measurement()

```
control.controller.Controller.req_beacon_measurement (
    self,
    RequestBeaconCommandBuilder rbm)
```

8.16.2.11 req_bss_tm()

```
bool control.controller.Controller.req_bss_tm (
    self,
    BssTmRequestBuilder rbtm)
```

8.16.2.12 req_link_measurement()

```
control.controller.Controller.req_link_measurement (
    self,
    LinkMeasurementCommandBuilder lm)
```

8.16.2.13 restart()

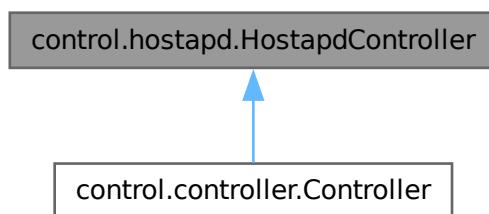
```
control.controller.Controller.restart (
    self)
```

The documentation for this class was generated from the following file:

- [control/controller.py](#)

8.17 control.hostapd.HostapdController Class Reference

Inheritance diagram for control.hostapd.HostapdController:



Public Member Functions

- `__init__` (self, `ctrl_path`="/var/run/hostapd/wlan0", `iface`="wlan0", RxMux `rxmlux`=None)
- `connect` (self)
- `start_read` (self)
- `stop_read` (self)
- `disconnect` (self)
- bool `send_command` (self, cmd, timeout=3.0)
- str|None `receive` (self, timeout=3.0)
- str|None `receive_event` (self, timeout=3.0)
- bool `handle_rx_msg` (self, str msg)
- `clear_reply` (self)
- `clear_events` (self)
- `repl` (self)

Public Attributes

- `ctrl_path` = ctrl_path
- `iface` = iface
- `sock` = None
- str `local_path` = f"/tmp/hostapd_ctrl_{os.getpid()}"
- Optional[RxMux] `rxmlux` = rxmlux
- `last_cmd_status` = LastCommandStatus.NOINIT

Protected Member Functions

- `_reader_loop` (self)

Protected Attributes

- `_event_queue` = queue.Queue()
- `_reply_queue` = queue.Queue()
- `_reader_thread` = None
- bool `_running` = False

8.17.1 Constructor & Destructor Documentation

8.17.1.1 `__init__()`

```
control.hostapd.HostapdController.__init__ (
    self,
    ctrl_path = "/var/run/hostapd/wlan0",
    iface = "wlan0",
    RxMux rxmlux = None)
```

8.17.2 Member Function Documentation

8.17.2.1 `_reader_loop()`

```
control.hostapd.HostapdController._reader_loop (
    self)  [protected]
```

Background thread to read from the socket and separate replies and events.

8.17.2.2 `clear_events()`

```
control.hostapd.HostapdController.clear_events (
    self)
```

8.17.2.3 `clear_reply()`

```
control.hostapd.HostapdController.clear_reply (
    self)
```

8.17.2.4 `connect()`

```
control.hostapd.HostapdController.connect (
    self)
```

Connect to the controller.

8.17.2.5 `disconnect()`

```
control.hostapd.HostapdController.disconnect (
    self)
```

Disconnect from the controller.

8.17.2.6 `handle_rx_msg()`

```
bool control.hostapd.HostapdController.handle_rx_msg (
    self,
    str msg)
```

8.17.2.7 receive()

```
str | None control.hostapd.HostapdController.receive (
    self,
    timeout = 3.0)
```

Retrieve a reply from _reply_queue, waiting up to timeout seconds.

8.17.2.8 receive_event()

```
str | None control.hostapd.HostapdController.receive_event (
    self,
    timeout = 3.0)
```

Retrieve an event from _event_queue, waiting up to timeout seconds.

8.17.2.9 repl()

```
control.hostapd.HostapdController.repl (
    self)
```

Simple REPL shell for interacting with the controller.
Type 'exit' or 'quit' to exit.

8.17.2.10 send_command()

```
bool control.hostapd.HostapdController.send_command (
    self,
    cmd,
    timeout = 3.0)
```

8.17.2.11 start_read()

```
control.hostapd.HostapdController.start_read (
    self)
```

8.17.2.12 stop_read()

```
control.hostapd.HostapdController.stop_read (
    self)
```

8.17.3 Member Data Documentation

8.17.3.1 `_event_queue`

```
control.hostapd.HostapdController._event_queue = queue.Queue() [protected]
```

8.17.3.2 `_reader_thread`

```
control.hostapd.HostapdController._reader_thread = None [protected]
```

8.17.3.3 `_reply_queue`

```
control.hostapd.HostapdController._reply_queue = queue.Queue() [protected]
```

8.17.3.4 `_running`

```
bool control.hostapd.HostapdController._running = False [protected]
```

8.17.3.5 `ctrl_path`

```
control.hostapd.HostapdController.ctrl_path = ctrl_path
```

8.17.3.6 `iface`

```
control.hostapd.HostapdController iface = iface
```

8.17.3.7 `last_cmd_status`

```
control.hostapd.HostapdController.last_cmd_status = LastCommandStatus.NOINIT
```

8.17.3.8 `local_path`

```
control.hostapd.HostapdController.local_path = f"/tmp/hostapd_ctrl_{os.getpid()}"
```

8.17.3.9 `rxmlux`

```
Optional[RxMux] control.hostapd.HostapdController.rxmlux = rxmlux
```

8.17.3.10 sock

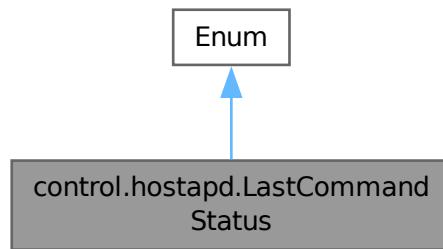
```
control.hostapd.HostapdController.sock = None
```

The documentation for this class was generated from the following file:

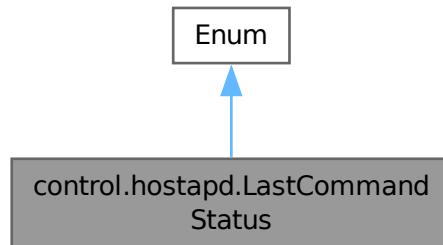
- [control/hostapd.py](#)

8.18 control.hostapd.LastCommandStatus Class Reference

Inheritance diagram for control.hostapd.LastCommandStatus:



Collaboration diagram for control.hostapd.LastCommandStatus:



Static Public Attributes

- int [OK](#) = 0
- int [FAIL](#) = 1
- int [NOINIT](#) = 2

8.18.1 Member Data Documentation

8.18.1.1 FAIL

```
int control.hostapd.LastCommandStatus.FAIL = 1 [static]
```

8.18.1.2 NOINIT

```
int control.hostapd.LastCommandStatus.NOINIT = 2 [static]
```

8.18.1.3 OK

```
int control.hostapd.LastCommandStatus.OK = 0 [static]
```

The documentation for this class was generated from the following file:

- [control/hostapd.py](#)

8.19 model.measurement.LinkMeasurement Class Reference

Public Member Functions

- Optional[float] [rss_i_dbm](#) (self)
- dict [to_dict](#) (self)

Static Public Member Functions

- "LinkMeasurement" [from_bytes](#) (bytes bts)

Public Attributes

- [rss_i_dbm](#)

Static Public Attributes

- Optional [sta_mac](#) = None
- int [measurement_token](#) = None
- Optional [tx_power](#) = None
- Optional [link_margin](#) = None
- Optional [rx_antenna_id](#) = None
- Optional [tx_antenna_id](#) = None
- Optional [rcpi](#) = None
- Optional [rsni](#) = None
- Optional [bssid](#) = None
- Optional [operating_class](#) = None
- Optional [channel_number](#) = None
- Optional [parent_tsf](#) = None

8.19.1 Detailed Description

802.11k Link Measurement Report

8.19.2 Member Function Documentation

8.19.2.1 from_bytes()

```
"LinkMeasurement" model.measurement.LinkMeasurement.from_bytes (
    bytes bts) [static]
```

8.19.2.2 rssi_dbm()

```
Optional[float] model.measurement.LinkMeasurement.rssi_dbm (
    self)
```

8.19.2.3 to_dict()

```
dict model.measurement.LinkMeasurement.to_dict (
    self)
```

Dump the complete state of the LinkMeasurement.

8.19.3 Member Data Documentation

8.19.3.1 bssid

```
model.measurement.LinkMeasurement.bssid = None [static]
```

8.19.3.2 channel_number

```
model.measurement.LinkMeasurement.channel_number = None [static]
```

8.19.3.3 link_margin

```
model.measurement.LinkMeasurement.link_margin = None [static]
```

8.19.3.4 measurement_token

```
model.measurement.LinkMeasurement.measurement_token = None [static]
```

8.19.3.5 **operating_class**

```
model.measurement.LinkMeasurement.operating_class = None [static]
```

8.19.3.6 **parent_tsf**

```
model.measurement.LinkMeasurement.parent_tsf = None [static]
```

8.19.3.7 **rcpi**

```
model.measurement.LinkMeasurement.rcpi = None [static]
```

8.19.3.8 **rsni**

```
model.measurement.LinkMeasurement.rsnsi = None [static]
```

8.19.3.9 **rssi_dbm**

```
model.measurement.LinkMeasurement.rssi_dbm
```

8.19.3.10 **rx_antenna_id**

```
model.measurement.LinkMeasurement.rx_antenna_id = None [static]
```

8.19.3.11 **sta_mac**

```
model.measurement.LinkMeasurement.sta_mac = None [static]
```

8.19.3.12 **tx_antenna_id**

```
model.measurement.LinkMeasurement.tx_antenna_id = None [static]
```

8.19.3.13 **tx_power**

```
model.measurement.LinkMeasurement.tx_power = None [static]
```

The documentation for this class was generated from the following file:

- model/[measurement.py](#)

8.20 link_measurement_cmd.LinkMeasurementCommandBuilder Class Reference

Public Member Functions

- `__init__` (self, str `mac`)
- str `build` (self)
- str `__str__` (self)

Public Attributes

- `mac` = mac

8.20.1 Constructor & Destructor Documentation

8.20.1.1 `__init__()`

```
link_measurement_cmd.LinkMeasurementCommandBuilder.__init__ (
    self,
    str mac)
```

8.20.2 Member Function Documentation

8.20.2.1 `__str__()`

```
str link_measurement_cmd.LinkMeasurementCommandBuilder.__str__ (
    self)
```

8.20.2.2 `build()`

```
str link_measurement_cmd.LinkMeasurementCommandBuilder.build (
    self)
```

8.20.3 Member Data Documentation

8.20.3.1 `mac`

```
link_measurement_cmd.LinkMeasurementCommandBuilder.mac = mac
```

The documentation for this class was generated from the following file:

- command/[link_measurement_cmd.py](#)

8.21 dashboard.lmrep_dashboard.LinkMeasurementDashboard Class Reference

Public Member Functions

- `__init__` (self, `LinkMeasurementDB db`)
- `str as_table` (self, `Optional[str] sort_by="measurement_token"`, `Optional[int] limit=None`)
- `show` (self, `Optional[str] sort_by="measurement_token"`, `Optional[int] limit=None`, `Optional[IO] pipe=None`, `bool replace=False`)

Public Attributes

- `db = db`

8.21.1 Detailed Description

Pretty, boxed/tabulated display of current LinkMeasurementDB contents.

8.21.2 Constructor & Destructor Documentation

8.21.2.1 __init__()

```
dashboard.lmrep_dashboard.LinkMeasurementDashboard.__init__ (
    self,
    LinkMeasurementDB db)
```

8.21.3 Member Function Documentation

8.21.3.1 as_table()

```
str dashboard.lmrep_dashboard.LinkMeasurementDashboard.as_table (
    self,
    Optional[str] sort_by = "measurement_token",
    Optional[int] limit = None)
```

8.21.3.2 show()

```
dashboard.lmrep_dashboard.LinkMeasurementDashboard.show (
    self,
    Optional[str] sort_by = "measurement_token",
    Optional[int] limit = None,
    Optional[IO] pipe = None,
    bool replace = False)
```

8.21.4 Member Data Documentation

8.21.4.1 db

```
dashboard.lmrep_dashboard.LinkMeasurementDashboard.db = db
```

The documentation for this class was generated from the following file:

- [dashboard/lmrep_dashboard.py](#)

8.22 db.lmrep_db.LinkMeasurementDB Class Reference

Public Member Functions

- [__new__\(cls\)](#)
- [__init__\(self\)](#)
- [add\(self, LinkMeasurement lm, Optional\[str\] sta_mac=None\)](#)
- [Optional\[LinkMeasurement\] get\(self, Optional\[str\] sta_mac=None\)](#)
- [Dict\[str, LinkMeasurement\] all\(self\)](#)
- [Dict\[str, LinkMeasurement\] raw\(self\)](#)
- [Dict\[str, dict\] to_dict\(self\)](#)
- [int count\(self\)](#)
- [clear\(self, Optional\[str\] sta_mac=None\)](#)
- [remove\(self, Optional\[str\] sta_mac=None\)](#)
- [bool __contains__\(self, str sta_mac\)](#)
- [__len__\(self\)](#)
- [__iter__\(self\)](#)
- [__repr__\(self\)](#)

Static Public Attributes

- [int expiration_sec = 300](#)

Protected Member Functions

- [bool __is_expired\(self, float ts\)](#)

Protected Attributes

- [dict _store = {}](#)
- [bool _initialized = True](#)

Static Protected Attributes

- [_instance = None](#)
- [_lock = RLock\(\)](#)

8.22.1 Detailed Description

Thread-safe DB storing exactly one LinkMeasurement per station,
with soft TTL expiration that applies ONLY on reads.
Internally stores timestamps but NEVER exposes them.

8.22.2 Constructor & Destructor Documentation

8.22.2.1 `__init__()`

```
db.lmrep_db.LinkMeasurementDB.__init__ (
    self)
```

8.22.3 Member Function Documentation

8.22.3.1 `__contains__()`

```
bool db.lmrep_db.LinkMeasurementDB.__contains__ (
    self,
    str sta_mac)
```

8.22.3.2 `__iter__()`

```
db.lmrep_db.LinkMeasurementDB.__iter__ (
    self)
```

8.22.3.3 `__len__()`

```
db.lmrep_db.LinkMeasurementDB.__len__ (
    self)
```

8.22.3.4 `__new__()`

```
db.lmrep_db.LinkMeasurementDB.__new__ (
    cls)
```

8.22.3.5 `__repr__()`

```
db.lmrep_db.LinkMeasurementDB.__repr__ (
    self)
```

8.22.3.6 _is_expired()

```
bool db.lmrep_db.LinkMeasurementDB._is_expired (
    self,
    float ts) [protected]
```

8.22.3.7 add()

```
db.lmrep_db.LinkMeasurementDB.add (
    self,
    LinkMeasurement lm,
    Optional[str] sta_mac = None)
```

8.22.3.8 all()

```
Dict[str, LinkMeasurement] db.lmrep_db.LinkMeasurementDB.all (
    self)
```

8.22.3.9 clear()

```
db.lmrep_db.LinkMeasurementDB.clear (
    self,
    Optional[str] sta_mac = None)
```

8.22.3.10 count()

```
int db.lmrep_db.LinkMeasurementDB.count (
    self)
```

8.22.3.11 get()

```
Optional[LinkMeasurement] db.lmrep_db.LinkMeasurementDB.get (
    self,
    Optional[str] sta_mac = None)
```

8.22.3.12 raw()

```
Dict[str, LinkMeasurement] db.lmrep_db.LinkMeasurementDB.raw (
    self)
```

8.22.3.13 remove()

```
db.lmrep_db.LinkMeasurementDB.remove (
    self,
    Optional[str] sta_mac = None)
```

8.22.3.14 `to_dict()`

```
Dict[str, dict] db.lmrep_db.LinkMeasurementDB.to_dict (
    self)
```

Return the complete state of the database, omitting timestamps.
Only unexpired entries are included.
The value is a dictionary as returned by measurement's `to_dict()`, or a `repr` if not available.

8.22.4 Member Data Documentation

8.22.4.1 `_initialized`

```
bool db.lmrep_db.LinkMeasurementDB._initialized = True [protected]
```

8.22.4.2 `_instance`

```
db.lmrep_db.LinkMeasurementDB._instance = None [static], [protected]
```

8.22.4.3 `_lock`

```
db.lmrep_db.LinkMeasurementDB._lock = RLock() [static], [protected]
```

8.22.4.4 `_store`

```
dict db.lmrep_db.LinkMeasurementDB._store = {} [protected]
```

8.22.4.5 `expiration_sec`

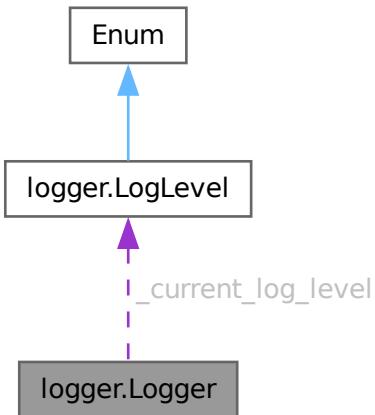
```
int db.lmrep_db.LinkMeasurementDB.expiration_sec = 300 [static]
```

The documentation for this class was generated from the following file:

- [db/lmrep_db.py](#)

8.23 logger.Logger Class Reference

Collaboration diagram for logger.Logger:



Public Member Functions

- `set_current_log_level (cls, LogLevel level)`
- `LogLevel get_current_log_level (cls)`

Static Public Member Functions

- None `log (LogLevel level, str msg)`
- None `log_err (str msg)`
- None `log_debug (str msg)`
- None `log_info (str msg)`

Static Protected Attributes

- `LogLevel _current_log_level = LogLevel.INFO`

8.23.1 Member Function Documentation

8.23.1.1 get_current_log_level()

```
LogLevel logger.Logger.get_current_log_level (
    cls)
```

8.23.1.2 log()

```
None logger.Logger.log (
    LogLevel level,
    str msg) [static]
```

8.23.1.3 log_debug()

```
None logger.Logger.log_debug (
    str msg) [static]
```

8.23.1.4 log_err()

```
None logger.Logger.log_err (
    str msg) [static]
```

8.23.1.5 log_info()

```
None logger.Logger.log_info (
    str msg) [static]
```

8.23.1.6 set_current_log_level()

```
logger.Logger.set_current_log_level (
    cls,
    LogLevel level)
```

8.23.2 Member Data Documentation

8.23.2.1 _current_log_level

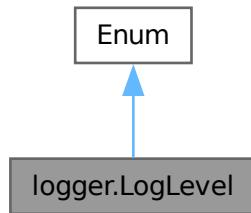
```
LogLevel logger._current_log_level = LogLevel.INFO [static], [protected]
```

The documentation for this class was generated from the following file:

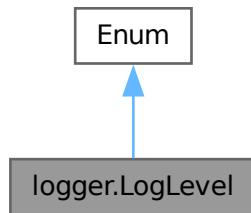
- [logger.py](#)

8.24 logger.LogLevel Class Reference

Inheritance diagram for logger.LogLevel:



Collaboration diagram for logger.LogLevel:



Static Public Member Functions

- "LogLevel" `int_to_level` (int level)

Static Public Attributes

- int `EXCESSIVE` = 0
- int `MSGDUMP` = 1
- int `DEBUG` = 2
- int `INFO` = 3
- int `WARNING` = 4
- int `ERROR` = 5

8.24.1 Member Function Documentation

8.24.1.1 int_to_level()

```
"LogLevel" logger.LogLevel.int_to_level (
    int level) [static]
```

8.24.2 Member Data Documentation

8.24.2.1 DEBUG

```
int logger.LogLevel.DEBUG = 2 [static]
```

8.24.2.2 ERROR

```
int logger.LogLevel.ERROR = 5 [static]
```

8.24.2.3 EXCESSIVE

```
int logger.LogLevel.EXCESSIVE = 0 [static]
```

8.24.2.4 INFO

```
int logger.LogLevel.INFO = 3 [static]
```

8.24.2.5 MSGDUMP

```
int logger.LogLevel.MSGDUMP = 1 [static]
```

8.24.2.6 WARNING

```
int logger.LogLevel.WARNING = 4 [static]
```

The documentation for this class was generated from the following file:

- [logger.py](#)

8.25 model.mac_address.MacAddress Class Reference

Public Member Functions

- `__init__ (self, str mac)`
- `__str__ (self)`
- `__repr__ (self)`
- bool `is_multicast (self)`
- bool `is_unicast (self)`
- bool `is_broadcast (self)`
- bool `is_local_administered (self)`
- str `oui (self)`
- str `client_part (self)`
- str `anonymized (self, str hash_algorithm="sha256", int length=12)`

Static Public Member Functions

- bool `is_valid (str mac)`

Public Attributes

- str `raw = self._normalize(mac)`
- str `octets = self.raw.split(":")`

Static Protected Member Functions

- str `_normalize (str mac)`

8.25.1 Detailed Description

Object for MAC address handling, parsing, and representation.

8.25.2 Constructor & Destructor Documentation

8.25.2.1 `__init__()`

```
model.mac_address.MacAddress.__init__ (
    self,
    str mac)
```

8.25.3 Member Function Documentation

8.25.3.1 `__repr__()`

```
model.mac_address.MacAddress.__repr__ (
    self)
```

8.25.3.2 `__str__()`

```
model.mac_address.MacAddress.__str__ (
    self)
```

8.25.3.3 `_normalize()`

```
str model.mac_address.MacAddress._normalize (
    str mac) [static], [protected]
```

8.25.3.4 `anonymized()`

```
str model.mac_address.MacAddress.anonymized (
    self,
    str hash_algorithm = "sha256",
    int length = 12)
```

Return the MAC address as OUI:HASHED_CLIENT_PART.
hash_algorithm: Hash function to use (e.g. 'sha256', 'md5').
length: Number of hex characters from digest to use.

8.25.3.5 `client_part()`

```
str model.mac_address.MacAddress.client_part (
    self)
```

Return the client-specific part (last three octets) as a string.

8.25.3.6 `is_broadcast()`

```
bool model.mac_address.MacAddress.is_broadcast (
    self)
```

8.25.3.7 `is_local_administered()`

```
bool model.mac_address.MacAddress.is_local_administered (
    self)
```

8.25.3.8 `is_multicast()`

```
bool model.mac_address.MacAddress.is_multicast (
    self)
```

8.25.3.9 is_unicast()

```
bool model.mac_address.MacAddress.is_unicast (
    self)
```

8.25.3.10 is_valid()

```
bool model.mac_address.MacAddress.is_valid (
    str mac) [static]
```

Check if the given string is a valid MAC address format.

Acceptable formats:

- XX:XX:XX:XX:XX:XX
- XX-XX-XX-XX-XX-XX
- XXXXXXXXXXXX

Returns True if valid, False otherwise.

8.25.3.11 oui()

```
str model.mac_address.MacAddress.oui (
    self)
```

Return the OUI (Organizationally Unique Identifier) as a string.

8.25.4 Member Data Documentation

8.25.4.1 octets

```
str model.mac_address.MacAddress.octets = self.raw.split(":")
```

8.25.4.2 raw

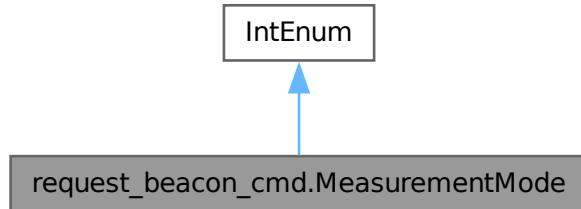
```
str model.mac_address.MacAddress.raw = self._normalize(mac)
```

The documentation for this class was generated from the following file:

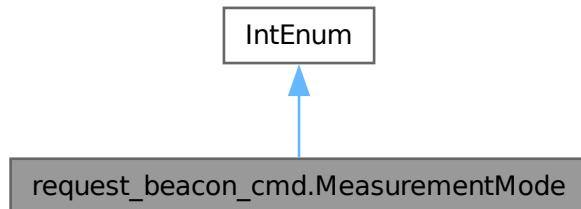
- model/[mac_address.py](#)

8.26 request_beacon_cmd.MeasurementMode Class Reference

Inheritance diagram for request_beacon_cmd.MeasurementMode:



Collaboration diagram for request_beacon_cmd.MeasurementMode:



Static Public Attributes

- int **PASSIVE** = 0
- int **ACTIVE** = 1
- int **TABLE** = 2

8.26.1 Detailed Description

Beacon measurement modes per IEEE 802.11k.

8.26.2 Member Data Documentation

8.26.2.1 ACTIVE

```
int request_beacon_cmd.MeasurementMode.ACTIVE = 1 [static]
```

8.26.2.2 PASSIVE

```
int request_beacon_cmd.MeasurementMode.PASSIVE = 0 [static]
```

8.26.2.3 TABLE

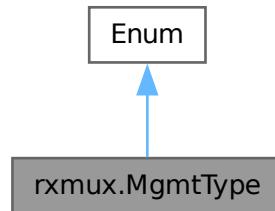
```
int request_beacon_cmd.MeasurementMode.TABLE = 2 [static]
```

The documentation for this class was generated from the following file:

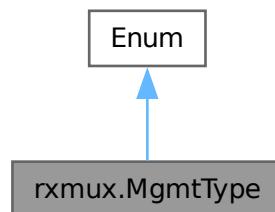
- command/[request_beacon_cmd.py](#)

8.27 rxmux.MgmtType Class Reference

Inheritance diagram for r xmux.MgmtType:



Collaboration diagram for r xmux.MgmtType:



Static Public Attributes

- int [LM_RESPONSE](#) = 3
- int [BM_RESPONSE](#) = 1
- int [BSS_TM_RESPONSE](#) = 8
- int [UNKNOWN](#) = -1

8.27.1 Member Data Documentation

8.27.1.1 BM_RESPONSE

```
int r xmux.MgmtType.BM_RESPONSE = 1 [static]
```

8.27.1.2 BSS_TM_RESPONSE

```
int r xmux.MgmtType.BSS_TM_RESPONSE = 8 [static]
```

8.27.1.3 LM_RESPONSE

```
int r xmux.MgmtType.LM_RESPONSE = 3 [static]
```

8.27.1.4 UNKNOWN

```
int r xmux.MgmtType.UNKNOWN = -1 [static]
```

The documentation for this class was generated from the following file:

- [protocol/rxmux.py](#)

8.28 model.neighbor.Neighbor Class Reference

Public Member Functions

- [__init__](#) (self)
- dict [to_dict](#) (self)
- [__dict__](#) (self)
- [__str__](#) (self)

Public Attributes

- str|None `bssid` = None
- str|None `ssid` = None
- str|None `nr_raw` = None
- int|None `bssid_info` = None
- int|None `oper_class` = None
- int|None `channel` = None
- int|None `phy_type` = None
- str|None `oper_class_desc` = None
- str|None `phy_type_desc` = None
- str|None `subelements` = None
- int|None `rcpi` = None
- int|None `rsni` = None

8.28.1 Detailed Description

Represents one neighbor entry from hostapd's SHOW_NEIGHBOR output.

8.28.2 Constructor & Destructor Documentation

8.28.2.1 `__init__()`

```
model.neighbor.Neighbor.__init__ (
    self)
```

8.28.3 Member Function Documentation

8.28.3.1 `__dict__()`

```
model.neighbor.Neighbor.__dict__ (
    self)
```

8.28.3.2 `__str__()`

```
model.neighbor.Neighbor.__str__ (
    self)
```

8.28.3.3 `to_dict()`

```
dict model.neighbor.Neighbor.to_dict (
    self)
```

Dump the complete state of the Neighbor object.
Returns a dictionary of all attributes.

8.28.4 Member Data Documentation

8.28.4.1 bssid

```
model.neighbor.Neighbor.bssid = None
```

8.28.4.2 bssid_info

```
model.neighbor.Neighbor.bssid_info = None
```

8.28.4.3 channel

```
model.neighbor.Neighbor.channel = None
```

8.28.4.4 nr_raw

```
model.neighbor.Neighbor.nr_raw = None
```

8.28.4.5 oper_class

```
model.neighbor.Neighbor.oper_class = None
```

8.28.4.6 oper_class_desc

```
model.neighbor.Neighbor.oper_class_desc = None
```

8.28.4.7 phy_type

```
model.neighbor.Neighbor.phy_type = None
```

8.28.4.8 phy_type_desc

```
model.neighbor.Neighbor.phy_type_desc = None
```

8.28.4.9 rcpi

```
model.neighbor.Neighbor.rcpi = None
```

8.28.4.10 rsni

```
model.neighbor.Neighbor.rsni = None
```

8.28.4.11 ssid

```
model.neighbor.Neighbor.ssid = None
```

8.28.4.12 subelements

```
model.neighbor.Neighbor.subelements = None
```

The documentation for this class was generated from the following file:

- [model/neighbor.py](#)

8.29 neighbor_cmd.NeighborCommandBuilder Class Reference

Public Member Functions

- [`__init__`](#) (self, Optional[[Neighbor](#)] `neighbor`=None, Optional[str] `bssid`=None, Optional[str] `ssid`=None, Optional[Dict[str, Any]] `nr`=None, Optional[Dict[str, Any]] `lci`=None, Optional[Dict[str, Any]] `civic`=None, bool `stationary`=False, Optional[int] `bss_parameter`=None)
- str [`build`](#) (self)
- str [`__str__`](#) (self)

Public Attributes

- `neighbor` = neighbor
- `bssid` = neighbor.bssid
- `ssid` = neighbor.ssid
- `nr` = None
- `lci` = lci
- `civic` = civic
- `stationary` = stationary
- `bss_parameter` = bss_parameter

Static Protected Member Functions

- str [`_encode_neighbor_report`](#) (Dict[str, Any] cfg)
- str [`_encode_lci`](#) (Dict[str, Any] lci)
- str [`_encode_civic`](#) (Dict[str, Any] civic)
- str [`_encode_ssid_hex`](#) (str ssid)

8.29.1 Detailed Description

Build and parse hostapd 'SET_NEIGHBOR' commands.

Example with NeighborInfo:

```
neighbor = NeighborInfo.from_line("00:11:22:33:44:55 ssid=MyNet nr=...")
req = NeighborCommandBuilder(
    neighbor=neighbor,
    lci={"latitude": 37.4219, "longitude": -122.0840, "altitude": 10.0},
    civic={"country": "US", "city": "MountainView"},
    stationary=True,
    bss_parameter=5
)
print(req.build())
```

Example with dict (backward compatible):

```
req = NeighborCommandBuilder(
    bssid="00:11:22:33:44:55",
    ssid="MyNet",
    nr={"bssid_info": 0x1234, "reg_class": 81, "channel": 6, "phy_type": 7},
    lci={"latitude": 37.4219, "longitude": -122.0840, "altitude": 10.0},
    civic={"country": "US", "city": "MountainView"},
    stationary=True,
    bss_parameter=5
)
print(req.build())
```

8.29.2 Constructor & Destructor Documentation

8.29.2.1 __init__()

```
neighbor_cmd.NeighborCommandBuilder.__init__ (
    self,
    Optional[Neighbor] neighbor = None,
    Optional[str] bssid = None,
    Optional[str] ssid = None,
    Optional[Dict[str, Any]] nr = None,
    Optional[Dict[str, Any]] lci = None,
    Optional[Dict[str, Any]] civic = None,
    bool stationary = False,
    Optional[int] bss_parameter = None)
```

8.29.3 Member Function Documentation

8.29.3.1 __str__()

```
str neighbor_cmd.NeighborCommandBuilder.__str__ (
    self)
```

8.29.3.2 _encode_civic()

```
str neighbor_cmd.NeighborCommandBuilder._encode_civic (
    Dict[str, Any] civic) [static], [protected]
```

Simplified civic info encoding:

country + city as ASCII, prefixed with lengths.

Example: [len_country][country_bytes][len_city][city_bytes]

8.29.3.3 `_encode_lci()`

```
str neighbor_cmd.NeighborCommandBuilder._encode_lci (
    Dict[str, Any] lci) [static], [protected]
```

Very simplified LCI encoding:
[latitude(8 bytes double)][longitude(8 bytes double)][altitude(4 bytes float)]

8.29.3.4 `_encode_neighbor_report()`

```
str neighbor_cmd.NeighborCommandBuilder._encode_neighbor_report (
    Dict[str, Any] cfg) [static], [protected]
```

Encode Neighbor Report fields into a minimal valid binary hex representation.
IEEE 802.11k format: [BSSID(6)][BSSID Info(4)][Reg Class(1)][Channel(1)][PHY Type(1)]

8.29.3.5 `_encode_ssid_hex()`

```
str neighbor_cmd.NeighborCommandBuilder._encode_ssid_hex (
    str ssid) [static], [protected]
```

Encode SSID as a hex string.

8.29.3.6 `build()`

```
str neighbor_cmd.NeighborCommandBuilder.build (
    self)
```

Builds the full 'SET_NEIGHBOR' command string with proper encoding.

8.29.4 Member Data Documentation

8.29.4.1 `bss_parameter`

```
neighbor_cmd.NeighborCommandBuilder.bss_parameter = bss_parameter
```

8.29.4.2 `bssid`

```
neighbor_cmd.NeighborCommandBuilder.bssid = neighbor.bssid
```

8.29.4.3 civic

```
neighbor_cmd.NeighborCommandBuilder.civic = civic
```

8.29.4.4 lci

```
neighbor_cmd.NeighborCommandBuilder.lci = lci
```

8.29.4.5 neighbor

```
neighbor_cmd.NeighborCommandBuilder.neighbor = neighbor
```

8.29.4.6 nr

```
neighbor_cmd.NeighborCommandBuilder.nr = None
```

8.29.4.7 ssid

```
neighbor_cmd.NeighborCommandBuilder.ssid = neighbor.ssid
```

8.29.4.8 stationary

```
neighbor_cmd.NeighborCommandBuilder.stationary = stationary
```

The documentation for this class was generated from the following file:

- command/[neighbor_cmd.py](#)

8.30 dashboard.neighbor_dashboard.NeighborDashboard Class Reference

Public Member Functions

- [__init__](#) (self, [NeighborDB](#) neighbordb)
- str [as_table](#) (self, Optional[str] sort_by="channel", Optional[int] limit=None)
- [show](#) (self, Optional[str] sort_by="channel", Optional[int] limit=None, Optional[IO] pipe=None, bool replace=False)

Public Attributes

- [db](#) = neighbordb

8.30.1 Detailed Description

Tabulated display of current NeighborDB contents, grouped by station MAC.

8.30.2 Constructor & Destructor Documentation

8.30.2.1 __init__()

```
dashboard.neighbor_dashboard.NeighborDashboard.__init__ (
    self,
    NeighborDB neighbordb)
```

8.30.3 Member Function Documentation

8.30.3.1 as_table()

```
str dashboard.neighbor_dashboard.NeighborDashboard.as_table (
    self,
    Optional[str] sort_by = "channel",
    Optional[int] limit = None)
```

8.30.3.2 show()

```
dashboard.neighbor_dashboard.NeighborDashboard.show (
    self,
    Optional[str] sort_by = "channel",
    Optional[int] limit = None,
    Optional[IO] pipe = None,
    bool replace = False)
```

Display dashboard to pipe OR socket OR stdout.

8.30.4 Member Data Documentation

8.30.4.1 db

```
dashboard.neighbor_dashboard.NeighborDashboard.db = neighbordb
```

The documentation for this class was generated from the following file:

- dashboard/[neighbor_dashboard.py](#)

8.31 db.neighbor_db.NeighborDB Class Reference

Public Member Functions

- `__new__` (cls)
- `__init__` (self)
- `add` (self, Neighbor neighbor, Optional[str] sta_mac=None)
- `remove` (self, str bssid, Optional[str] sta_mac=None)
- Optional[Neighbor] `get` (self, str bssid, Optional[str] sta_mac=None)
- list[Neighbor] `all_for_sta` (self, Optional[str] sta_mac=None)
- Dict[str, list[Neighbor]] `all` (self)
- int `count` (self, Optional[str] sta_mac=None)
- `clear` (self, Optional[str] sta_mac=None)
- bool `contains` (self, str sta_mac)
- `len` (self)
- `iter` (self)
- Dict[str, Dict[str, dict]] `to_dict` (self)
- `repr` (self)

Protected Attributes

- dict `_db` = {}
- bool `_initialized` = True

Static Protected Attributes

- `_instance` = None
- `_lock` = RLock()

8.31.1 Detailed Description

Database of neighbors associated with stations (STA MACs).

8.31.2 Constructor & Destructor Documentation

8.31.2.1 __init__()

```
db.neighbor_db.NeighborDB.__init__ (
    self)
```

8.31.3 Member Function Documentation

8.31.3.1 __contains__()

```
bool db.neighbor_db.NeighborDB.__contains__ (
    self,
    str sta_mac)
```

8.31.3.2 __iter__()

```
db.neighbor_db.NeighborDB.__iter__ (
    self)
```

Iterate over all neighbors (flattened).

8.31.3.3 __len__()

```
db.neighbor_db.NeighborDB.__len__ (
    self)
```

8.31.3.4 __new__()

```
db.neighbor_db.NeighborDB.__new__ (
    cls)
```

Singleton instantiation.

8.31.3.5 __repr__()

```
db.neighbor_db.NeighborDB.__repr__ (
    self)
```

8.31.3.6 add()

```
db.neighbor_db.NeighborDB.add (
    self,
    Neighbor neighbor,
    Optional[str] sta_mac = None)
```

Add or update a neighbor for a given station MAC.

If sta_mac is None, defaults to AP MAC (00:00:00:00:00:00)

8.31.3.7 all()

```
Dict[str, list[Neighbor]] db.neighbor_db.NeighborDB.all (
    self)
```

Return all neighbors grouped by station MAC.

8.31.3.8 all_for_sta()

```
list[Neighbor] db.neighbor_db.NeighborDB.all_for_sta (
    self,
    Optional[str] sta_mac = None)
```

Return all neighbors for a specific station.

8.31.3.9 clear()

```
db.neighbor_db.NeighborDB.clear (
    self,
    Optional[str] sta_mac = None)
```

Clear neighbors for a station or all if *sta_mac* is None.

8.31.3.10 count()

```
int db.neighbor_db.NeighborDB.count (
    self,
    Optional[str] sta_mac = None)
```

Count neighbors for a station or all neighbors if *sta_mac* is None.

8.31.3.11 get()

```
Optional[Neighbor] db.neighbor_db.NeighborDB.get (
    self,
    str bssid,
    Optional[str] sta_mac = None)
```

Retrieve a neighbor by station MAC and BSSID.

8.31.3.12 remove()

```
db.neighbor_db.NeighborDB.remove (
    self,
    str bssid,
    Optional[str] sta_mac = None)
```

Remove a neighbor for a given station MAC.

8.31.3.13 to_dict()

```
Dict[str, Dict[str, dict]] db.neighbor_db.NeighborDB.to_dict (
    self)
```

Dump the complete state of the database.
 Returns a nested dictionary: sta_mac -> bssid -> dict (neighbor representation).

8.31.4 Member Data Documentation**8.31.4.1 _db**

```
dict db.neighbor_db.NeighborDB._db = {} [protected]
```

8.31.4.2 _initialized

```
bool db.neighbor_db.NeighborDB._initialized = True [protected]
```

8.31.4.3 _instance

```
db.neighbor_db.NeighborDB._instance = None [static], [protected]
```

8.31.4.4 _lock

```
db.neighbor_db.NeighborDB._lock = RLock() [static], [protected]
```

The documentation for this class was generated from the following file:

- db/neighbor_db.py

8.32 neighbor_parser.NeighborParser Class Reference**Static Public Member Functions**

- bytes [make_nr](#) (str bssid, int bssid_info, int oper_class, int channel, int phy_type, bytes subelements=b'")
- "Neighbor" [from_line](#) (str line)
- dict[str, Any] [as_dict](#) ([Neighbor](#) neib)
- str [to_nr_hex](#) ([Neighbor](#) neib)

Static Protected Member Functions

- [_parse_nr](#) ([Neighbor](#) neib)
- str [_decode_hex_ssid](#) (str hex_str)

8.32.1 Member Function Documentation

8.32.1.1 `_decode_hex_ssid()`

```
str neighbor_parser.NeighborParser._decode_hex_ssid (
    str hex_str) [static], [protected]
```

8.32.1.2 `_parse_nr()`

```
neighbor_parser.NeighborParser._parse_nr (
    Neighbor neib) [static], [protected]
```

8.32.1.3 `as_dict()`

```
dict[str, Any] neighbor_parser.NeighborParser.as_dict (
    Neighbor neib) [static]
```

8.32.1.4 `from_line()`

```
"Neighbor" neighbor_parser.NeighborParser.from_line (
    str line) [static]
```

8.32.1.5 `make_nr()`

```
bytes neighbor_parser.NeighborParser.make_nr (
    str bssid,
    int bssid_info,
    int oper_class,
    int channel,
    int phy_type,
    bytes subelements = b"") [static]
```

Construct the NR (Neighbor Report) binary field (IEEE 802.11 7.3.2.90.10).
 Args:

bssid: str - MAC address in string format (e.g., "aa:bb:cc:dd:ee:ff")
 bssid_info: int - BSSID Information (4 bytes, little-endian)
 oper_class: int - Operating class (1 byte)
 channel: int - Channel number (1 byte)
 phy_type: int - PHY type (1 byte)
 subelements: bytes - Optional trailing subelements (variable length)

Returns:
 bytes - NR field binary encoding

8.32.1.6 `to_nr_hex()`

```
str neighbor_parser.NeighborParser.to_nr_hex (
    Neighbor neib) [static]
```

Convert this NeighborInfo to a hex string suitable for SET_NEIGHBOR command.
 Returns the hex-encoded NR (Neighbor Report) field.

The documentation for this class was generated from the following file:

- [parser/neighbor_parser.py](#)

8.33 metrics.nbranking.NeighborRanking Class Reference

Public Member Functions

- `__init__` (self, StationDB stdb, NeighborRankingDB nrdb, BeaconMeasurementDB bmr, NeighborDB ndb)
- `update` (self)

Public Attributes

- `nrdb` = nrdb
- `bmr` = bmr
- `ndb` = ndb
- `stdb` = stdb

Static Protected Member Functions

- List[`Neighbor`] `_rank_beacon` (Station station, List[`BeaconMeasurement`] lbmr, NeighborDB nb)
- List[`Neighbor`] `_rank_nobeacon` (Station station, NeighborDB nb)

8.33.1 Constructor & Destructor Documentation

8.33.1.1 `__init__()`

```
metrics.nbranking.NeighborRanking.__init__ (
    self,
    StationDB stdb,
    NeighborRankingDB nrdb,
    BeaconMeasurementDB bmr,
    NeighborDB ndb)
```

8.33.2 Member Function Documentation

8.33.2.1 `_rank_beacon()`

```
List[Neighbor] metrics.nbranking.NeighborRanking._rank_beacon (
    Station station,
    List[BeaconMeasurement] lbmr,
    NeighborDB nb) [static], [protected]
```

Create Neighbor objects from BeaconReport entries and rank them.

Scoring:

```
score = rssi_dbm + 0.5 * snr_db + (known_neighbor ? bonus : 0)
Higher score == better neighbor.
```

8.33.2.2 `_rank_nobeacon()`

```
List[Neighbor] metrics.nbranking.NeighborRanking._rank_nobeacon (
    Station station,
    NeighborDB nb) [static], [protected]
```

Fallback ranking when no beacon measurements are available.
 Simply returns the NeighborDB entries for that station ordered:
 1) neighbors with an SSID first (likely real APs)
 2) then by BSSID lexicographically

8.33.2.3 `update()`

```
metrics.nbranking.NeighborRanking.update (
    self)
```

8.33.3 Member Data Documentation

8.33.3.1 `bmr`

```
metrics.nbranking.NeighborRanking.bmr = bmr
```

8.33.3.2 `ndb`

```
metrics.nbranking.NeighborRanking.ndb = ndb
```

8.33.3.3 `nrdb`

```
metrics.nbranking.NeighborRanking.nrdb = nrdb
```

8.33.3.4 `stdb`

```
metrics.nbranking.NeighborRanking.std़ = std़
```

The documentation for this class was generated from the following file:

- [metrics/nbranking.py](#)

8.34 `dashboard.nrank_dashboard.NeighborRankingDashboard` Class Reference

Public Member Functions

- [`__init__`](#) (self, **NeighborRankingDB** nr_db)
- [`str as_table`](#) (self, Optional[int] limit=None)
- [`show`](#) (self, Optional[int] limit=None, Optional[IO] pipe=None, bool replace=False)

Public Attributes

- `db = nr_db`

8.34.1 Detailed Description

Prettier, tabulated display of current NeighborRankingDB contents.

8.34.2 Constructor & Destructor Documentation

8.34.2.1 `__init__()`

```
dashboard.nbrank_dashboard.NeighborRankingDashboard.__init__ (
    self,
    NeighborRankingDB nr_db)
```

8.34.3 Member Function Documentation

8.34.3.1 `as_table()`

```
str dashboard.nbrank_dashboard.NeighborRankingDashboard.as_table (
    self,
    Optional[int] limit = None)
```

8.34.3.2 `show()`

```
dashboard.nbrank_dashboard.NeighborRankingDashboard.show (
    self,
    Optional[int] limit = None,
    Optional[IO] pipe = None,
    bool replace = False)
```

Display the dashboard ... print or send to FIFO or socket.

8.34.4 Member Data Documentation

8.34.4.1 `db`

```
dashboard.nbrank_dashboard.NeighborRankingDashboard.db = nr_db
```

The documentation for this class was generated from the following file:

- dashboard/nbrank_dashboard.py

8.35 db.nbrank_db.NeighborRankingDB Class Reference

Public Member Functions

- `__new__` (cls)
- `__init__` (self)
- `set_ranking` (self, str sta_mac, List[[Neighbor](#)] neighbors)
- `add_neighbor` (self, str sta_mac, [Neighbor](#) neighbor)
- List[[Neighbor](#)] `get_ranking` (self, Optional[str] sta_mac=None)
- `remove` (self, Optional[str] sta_mac=None)
- Dict[str, List[[Neighbor](#)]] `all` (self)
- int `count` (self, Optional[str] sta_mac=None)
- `clear` (self, Optional[str] sta_mac=None)
- Dict[str, list] `to_dict` (self)
- bool `__contains__` (self, str sta_mac)
- `__len__` (self)
- `__iter__` (self)
- `__repr__` (self)

Protected Attributes

- dict `_db` = {}
- bool `_initialized` = True

Static Protected Attributes

- `_instance` = None
- `_lock` = RLock()

8.35.1 Detailed Description

Thread-safe singleton database for neighbor rankings per station MAC.

8.35.2 Constructor & Destructor Documentation

8.35.2.1 `__init__()`

```
db.nbrank_db.NeighborRankingDB.__init__ (
    self)
```

8.35.3 Member Function Documentation

8.35.3.1 `__contains__()`

```
bool db.nbrank_db.NeighborRankingDB.__contains__ (
    self,
    str sta_mac)
```

8.35.3.2 __iter__()

```
db.nrank_db.NeighborRankingDB.__iter__ (
    self)
```

Iterate over all neighbors (flattened).

8.35.3.3 __len__()

```
db.nrank_db.NeighborRankingDB.__len__ (
    self)
```

8.35.3.4 __new__()

```
db.nrank_db.NeighborRankingDB.__new__ (
    cls)
```

8.35.3.5 __repr__()

```
db.nrank_db.NeighborRankingDB.__repr__ (
    self)
```

8.35.3.6 add_neighbor()

```
db.nrank_db.NeighborRankingDB.add_neighbor (
    self,
    str sta_mac,
    Neighbor neighbor)
```

Add or update a neighbor in the ranking for a station (appends to the end).

8.35.3.7 all()

```
Dict[str, List[Neighbor]] db.nrank_db.NeighborRankingDB.all (
    self)
```

Return the entire database.

8.35.3.8 clear()

```
db.nrank_db.NeighborRankingDB.clear (
    self,
    Optional[str] sta_mac = None)
```

Clear neighbor rankings for a station or all stations.

8.35.3.9 count()

```
int db.nbrank_db.NeighborRankingDB.count (
    self,
    Optional[str] sta_mac = None)
```

Count neighbors for a station or total if None.

8.35.3.10 get_ranking()

```
List[Neighbor] db.nbrank_db.NeighborRankingDB.get_ranking (
    self,
    Optional[str] sta_mac = None)
```

Get the ordered neighbor ranking for a station.

8.35.3.11 remove()

```
db.nbrank_db.NeighborRankingDB.remove (
    self,
    Optional[str] sta_mac = None)
```

Remove the ranking for a station.

8.35.3.12 set_ranking()

```
db.nbrank_db.NeighborRankingDB.set_ranking (
    self,
    str sta_mac,
    List[Neighbor] neighbors)
```

Set the ordered neighbor ranking for a station.

8.35.3.13 to_dict()

```
Dict[str, list] db.nbrank_db.NeighborRankingDB.to_dict (
    self)
```

Dump the entire state of the database.

For each station MAC, returns a list of dicts (one per Neighbor, using Neighbor.to_dict() if available).

8.35.4 Member Data Documentation

8.35.4.1 `_db`

```
dict db.nrank_db.NeighborRankingDB._db = {} [protected]
```

8.35.4.2 `_initialized`

```
bool db.nrank_db.NeighborRankingDB._initialized = True [protected]
```

8.35.4.3 `_instance`

```
db.nrank_db.NeighborRankingDB._instance = None [static], [protected]
```

8.35.4.4 `_lock`

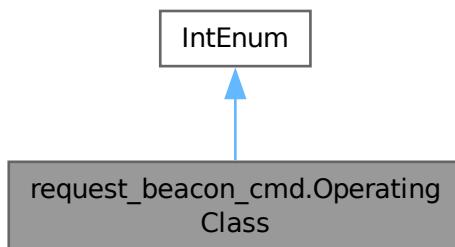
```
db.nrank_db.NeighborRankingDB._lock = RLock() [static], [protected]
```

The documentation for this class was generated from the following file:

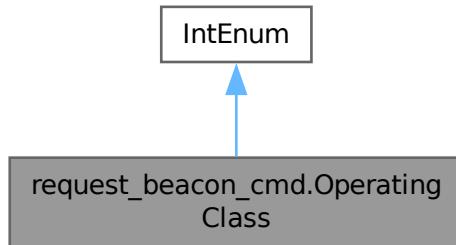
- db/nrank_db.py

8.36 request_beacon_cmd.OperatingClass Class Reference

Inheritance diagram for request_beacon_cmd.OperatingClass:



Collaboration diagram for request_beacon_cmd.OperatingClass:



Static Public Attributes

- int `CLASS_2_4GHZ_20MHZ` = 81
- int `CLASS_2_4GHZ_40MHZ` = 82
- int `CLASS_5GHZ_20MHZ` = 115
- int `CLASS_5GHZ_40MHZ` = 116
- int `CLASS_5GHZ_80MHZ` = 117

8.36.1 Detailed Description

Common 802.11 operating classes for 2.4GHz and 5GHz.

8.36.2 Member Data Documentation

8.36.2.1 CLASS_2_4GHZ_20MHZ

```
int request_beacon_cmd.OperatingClass.CLASS_2_4GHZ_20MHZ = 81 [static]
```

8.36.2.2 CLASS_2_4GHZ_40MHZ

```
int request_beacon_cmd.OperatingClass.CLASS_2_4GHZ_40MHZ = 82 [static]
```

8.36.2.3 CLASS_5GHZ_20MHZ

```
int request_beacon_cmd.OperatingClass.CLASS_5GHZ_20MHZ = 115 [static]
```

8.36.2.4 CLASS_5GHZ_40MHZ

```
int request_beacon_cmd.OperatingClass.CLASS_5GHZ_40MHZ = 116 [static]
```

8.36.2.5 CLASS_5GHZ_80MHZ

```
int request_beacon_cmd.OperatingClass.CLASS_5GHZ_80MHZ = 117 [static]
```

The documentation for this class was generated from the following file:

- command/[request_beacon_cmd.py](#)

8.37 dashboard.pipe_pool.PipePool Class Reference

Public Member Functions

- [`__init__`](#) (self)
- IO [`create`](#) (self, str name, str path, str mode="w")
- Optional[IO] [`get`](#) (self, str name)
- [`close`](#) (self, str name)
- [`destroy`](#) (self)
- list[str] [`list`](#) (self)
- [`__len__`](#) (self)
- [`__repr__`](#) (self)

Protected Attributes

- dict [`_pipes`](#) = {}
- dict [`_paths`](#) = {}
- [`_lock`](#) = threading.RLock()

8.37.1 Detailed Description

Manages multiple named pipes (FIFOs) for simple IPC streaming.

8.37.2 Constructor & Destructor Documentation

8.37.2.1 [`__init__`](#)()

```
dashboard.pipe_pool.PipePool.__init__ (
    self)
```

8.37.3 Member Function Documentation

8.37.3.1 [`__len__`](#)()

```
dashboard.pipe_pool.PipePool.__len__ (
    self)
```

8.37.3.2 __repr__()

```
dashboard.pipe_pool.PipePool.__repr__ (
    self)
```

8.37.3.3 close()

```
dashboard.pipe_pool.PipePool.close (
    self,
    str name)
```

Close a pipe and optionally remove its file.

8.37.3.4 create()

```
IO dashboard.pipe_pool.PipePool.create (
    self,
    str name,
    str path,
    str mode = "w")
```

Create or open a named pipe (FIFO).

Args:

name: logical name for the pipe
path: filesystem path to the FIFO
mode: 'w' for writer, 'r' for reader

8.37.3.5 destroy()

```
dashboard.pipe_pool.PipePool.destroy (
    self)
```

Close and clean up all pipes.

8.37.3.6 get()

```
Optional[IO] dashboard.pipe_pool.PipePool.get (
    self,
    str name)
```

Retrieve a pipe by name.

8.37.3.7 list()

```
list[str] dashboard.pipe_pool.PipePool.list (
    self)
```

List all active pipe names.

8.37.4 Member Data Documentation

8.37.4.1 _lock

```
dashboard.pipe_pool.PipePool._lock = threading.RLock() [protected]
```

8.37.4.2 _paths

```
dict dashboard.pipe_pool.PipePool._paths = {} [protected]
```

8.37.4.3 _pipes

```
dashboard.pipe_pool.PipePool._pipes = {} [protected]
```

The documentation for this class was generated from the following file:

- dashboard/[pipe_pool.py](#)

8.38 metrics.qoe.QoE Class Reference

Public Member Functions

- [__init__\(self\)](#)
- [QoEComponents compute_qoe\(self, Station station, Optional\[LinkMeasurement\] lm=None\)](#)
- [update\(self\)](#)
- [Optional\[QoEComponents\] get_components\(self, str mac\)](#)
- [Optional\[QoEHistory\] get_history\(self, str mac\)](#)
- [List\[tuple\[str, float\]\] get_worst_stations\(self, int n=5\)](#)
- [List\[tuple\[str, float\]\] get_best_stations\(self, int n=5\)](#)
- [Dict get_statistics\(self\)](#)

Public Attributes

- [stdb = StationDB\(\)](#)
- [qoedb = QoEDB\(\)](#)
- [lmdb = LinkMeasurementDB\(\)](#)
- [dict history = {}](#)
- [dict component_cache = {}](#)

Static Public Attributes

- int `RSSI_EXCELLENT` = -50
- int `RSSI_GOOD` = -65
- int `RSSI_POOR` = -80
- int `SNR_EXCELLENT` = 35
- int `SNR_GOOD` = 25
- int `SNR_POOR` = 10
- int `BITRATE_EXCELLENT` = 400
- int `BITRATE_GOOD` = 150
- int `BITRATE_POOR` = 20
- int `INACTIVE_THRESHOLD_MS` = 5000
- int `INACTIVE_CRITICAL_MS` = 20000
- float `RETRY_RATE_ACCEPTABLE` = 0.05
- float `RETRY_RATE_POOR` = 0.20
- float `FCS_RATE_ACCEPTABLE` = 0.01
- float `FCS_RATE_POOR` = 0.05
- int `BACKLOG_ACCEPTABLE` = 10
- int `BACKLOG_CRITICAL` = 100
- float `MAX_RELIABILITY_PENALTY` = 0.85
- float `MAX_LATENCY_PENALTY` = 0.70
- float `MAX_ACTIVITY_PENALTY` = 0.80
- float `SCORE_FLOOR` = 0.05

Protected Member Functions

- float `_compute_connectivity` (self, `Station` station)
- float `_compute_signal_quality` (self, `Station` station, `Optional[LinkMeasurement]` lm)
- float `_compute_throughput` (self, `Station` station)
- float `_compute_reliability` (self, `Station` station)
- float `_compute_latency` (self, `Station` station)
- float `_compute_activity` (self, `Station` station)

Static Protected Member Functions

- float `_clamp` (float value, float min_val=0.0, float max_val=1.0)
- float `_normalize_linear` (`Optional[float]` value, float poor, float good, float excellent, float floor=0.1)

8.38.1 Detailed Description

Compute and maintain QoE (Quality of Experience) scores for WiFi stations.

QoE is a multi-dimensional metric (0.0 to 1.0) that combines:

- Signal Quality: RSSI, SNR, link margin (30%)
- Reliability: Packet errors, retries, FCS errors (25%)
- Throughput: Bitrates, efficiency (20%)
- Latency: Queue backlog, inactive time (15%)
- Activity: Recent traffic, engagement (10%)

Higher scores indicate better user experience.

8.38.2 Constructor & Destructor Documentation

8.38.2.1 `__init__()`

```
metrics.qoe.QoE.__init__ (
    self)
```

8.38.3 Member Function Documentation

8.38.3.1 `_clamp()`

```
float metrics.qoe.QoE._clamp (
    float value,
    float min_val = 0.0,
    float max_val = 1.0) [static], [protected]
```

Ensure value is within valid range.

8.38.3.2 `_compute_activity()`

```
float metrics.qoe.QoE._compute_activity (
    self,
    Station station) [protected]
```

Activity level based on recent traffic and engagement.
Inactive stations should have lower QoE as they're not actively used.

8.38.3.3 `_compute_connectivity()`

```
float metrics.qoe.QoE._compute_connectivity (
    self,
    Station station) [protected]
```

Basic connectivity indicator for API compatibility.
Returns 1.0 for authorized/associated stations, 0.0 otherwise.
Not used in overall QoE score calculation.

8.38.3.4 `_compute_latency()`

```
float metrics.qoe.QoE._compute_latency (
    self,
    Station station) [protected]
```

Latency indicator based on backlog packets and inactive time.
Lower is better for responsiveness.

8.38.3.5 `_compute_reliability()`

```
float metrics.qoe.QoE._compute_reliability (
    self,
    Station station) [protected]
```

Reliability based on retry rates, FCS errors, and packet failures.
Uses multiplicative penalties capped at maximum.

8.38.3.6 `_compute_signal_quality()`

```
float metrics.qoe.QoE._compute_signal_quality (
    self,
    Station station,
    Optional[LinkMeasurement] lm) [protected]
```

Signal quality based on RSSI, SNR, and link margin.
Average of available metrics, weighted equally.

8.38.3.7 `_compute_throughput()`

```
float metrics.qoe.QoE._compute_throughput (
    self,
    Station station) [protected]
```

Throughput score based on actual bitrates and efficiency.
Uses the best available rate indicator.

8.38.3.8 `_normalize_linear()`

```
float metrics.qoe.QoE._normalize_linear (
    Optional[float] value,
    float poor,
    float good,
    float excellent,
    float floor = 0.1) [static], [protected]
```

Normalize a value using piecewise linear interpolation.

Returns floor if value <= poor, 1.0 if value >= excellent,
and interpolates linearly between poor-good and good-excellent.

8.38.3.9 `compute_qoe()`

```
QoEComponents metrics.qoe.QoE.compute_qoe (
    self,
    Station station,
    Optional[LinkMeasurement] lm = None)
```

Compute comprehensive QoE for a station.
Returns QoEComponents with all metrics and overall score.

8.38.3.10 `get_best_stations()`

```
List[tuple[str, float]] metrics.qoe.QoE.get_best_stations (
    self,
    int n = 5)
```

Get the N stations with highest QoE.

8.38.3.11 `get_components()`

```
Optional[QoEComponents] metrics.qoe.QoE.get_components (
    self,
    str mac)
```

Get detailed QoE breakdown for a station.

8.38.3.12 `get_history()`

```
Optional[QoEHistory] metrics.qoe.QoE.get_history (
    self,
    str mac)
```

Get QoE history for trend analysis.

8.38.3.13 `get_statistics()`

```
Dict metrics.qoe.QoE.get_statistics (
    self)
```

Get overall QoE statistics across all stations.

8.38.3.14 `get_worst_stations()`

```
List[tuple[str, float]] metrics.qoe.QoE.get_worst_stations (
    self,
    int n = 5)
```

Get the N stations with lowest QoE.

8.38.3.15 update()

```
metrics.qoe.QoE.update (
    self)
```

Iterate through all stations and update QoE database.
Only logs outliers to reduce noise.

8.38.4 Member Data Documentation

8.38.4.1 BACKLOG_ACCEPTABLE

```
int metrics.qoe.QoE.BACKLOG_ACCEPTABLE = 10 [static]
```

8.38.4.2 BACKLOG_CRITICAL

```
int metrics.qoe.QoE.BACKLOG_CRITICAL = 100 [static]
```

8.38.4.3 BITRATE_EXCELLENT

```
metrics.qoe.QoE.BITRATE_EXCELLENT = 400 [static]
```

8.38.4.4 BITRATE_GOOD

```
metrics.qoe.QoE.BITRATE_GOOD = 150 [static]
```

8.38.4.5 BITRATE_POOR

```
metrics.qoe.QoE.BITRATE_POOR = 20 [static]
```

8.38.4.6 component_cache

```
dict metrics.qoe.QoE.component_cache = {}
```

8.38.4.7 FCS_RATE_ACCEPTABLE

```
float metrics.qoe.QoE.FCS_RATE_ACCEPTABLE = 0.01 [static]
```

8.38.4.8 FCS_RATE_POOR

```
float metrics.qoe.QoE.FCS_RATE_POOR = 0.05 [static]
```

8.38.4.9 history

```
dict metrics.qoe.QoE.history = {}
```

8.38.4.10 INACTIVE_CRITICAL_MS

```
int metrics.qoe.QoE.INACTIVE_CRITICAL_MS = 20000 [static]
```

8.38.4.11 INACTIVE_THRESHOLD_MS

```
int metrics.qoe.QoE.INACTIVE_THRESHOLD_MS = 5000 [static]
```

8.38.4.12 lmdb

```
metrics.qoe.QoE.lmdb = LinkMeasurementDB\(\)
```

8.38.4.13 MAX_ACTIVITY_PENALTY

```
float metrics.qoe.QoE.MAX_ACTIVITY_PENALTY = 0.80 [static]
```

8.38.4.14 MAX_LATENCY_PENALTY

```
float metrics.qoe.QoE.MAX_LATENCY_PENALTY = 0.70 [static]
```

8.38.4.15 MAX_RELIABILITY_PENALTY

```
float metrics.qoe.QoE.MAX_RELIABILITY_PENALTY = 0.85 [static]
```

8.38.4.16 qoedb

```
metrics.qoe.QoE.qoedb = QoEDB\(\)
```

8.38.4.17 RETRY_RATE_ACCEPTABLE

```
float metrics.qoe.QoE.RETRY_RATE_ACCEPTABLE = 0.05 [static]
```

8.38.4.18 RETRY_RATE_POOR

```
float metrics.qoe.QoE.RETRY_RATE_POOR = 0.20 [static]
```

8.38.4.19 RSSI_EXCELLENT

```
int metrics.qoe.QoE.RSSI_EXCELLENT = -50 [static]
```

8.38.4.20 RSSI_GOOD

```
int metrics.qoe.QoE.RSSI_GOOD = -65 [static]
```

8.38.4.21 RSSI_POOR

```
int metrics.qoe.QoE.RSSI_POOR = -80 [static]
```

8.38.4.22 SCORE_FLOOR

```
metrics.qoe.QoE.SCORE_FLOOR = 0.05 [static]
```

8.38.4.23 SNR_EXCELLENT

```
int metrics.qoe.QoE.SNR_EXCELLENT = 35 [static]
```

8.38.4.24 SNR_GOOD

```
int metrics.qoe.QoE.SNR_GOOD = 25 [static]
```

8.38.4.25 SNR_POOR

```
int metrics.qoe.QoE.SNR_POOR = 10 [static]
```

8.38.4.26 stdb

```
metrics.qoe.QoE.stdB = StationDB()
```

The documentation for this class was generated from the following file:

- metrics/qoe.py

8.39 metrics.qoe.QoEComponents Class Reference

Public Member Functions

- float [overall](#) (self)
- Dict [to_dict](#) (self)

Public Attributes

- [overall](#)

Static Public Attributes

- float `connectivity` = 0.0
- float `signal_quality` = 0.0
- float `reliability` = 0.0
- float `throughput` = 0.0
- float `latency` = 0.0
- float `activity` = 0.0
- datetime `timestamp` = field(default_factory=datetime.now)

8.39.1 Detailed Description

Breakdown of QoE score components for transparency.

8.39.2 Member Function Documentation

8.39.2.1 `overall()`

```
float metrics.qoe.QoEComponents.overall (
    self)
```

Weighted average of all components based on user impact.

8.39.2.2 `to_dict()`

```
Dict metrics.qoe.QoEComponents.to_dict (
    self)
```

8.39.3 Member Data Documentation

8.39.3.1 `activity`

```
metrics.qoe.QoEComponents.activity = 0.0 [static]
```

8.39.3.2 `connectivity`

```
metrics.qoe.QoEComponents.connectivity = 0.0 [static]
```

8.39.3.3 latency

```
metrics.qoe.QoEComponents.latency = 0.0 [static]
```

8.39.3.4 overall

```
metrics.qoe.QoEComponents.overall
```

8.39.3.5 reliability

```
metrics.qoe.QoEComponents.reliability = 0.0 [static]
```

8.39.3.6 signal_quality

```
metrics.qoe.QoEComponents.signal_quality = 0.0 [static]
```

8.39.3.7 throughput

```
metrics.qoe.QoEComponents.throughput = 0.0 [static]
```

8.39.3.8 timestamp

```
datetime metrics.qoe.QoEComponents.timestamp = field(default_factory=datetime.now) [static]
```

The documentation for this class was generated from the following file:

- [metrics/qoe.py](#)

8.40 dashboard.qoe_dashboard.QoEDashboard Class Reference

Public Member Functions

- [__init__](#) (self, [QoEDB](#) qoedb, [Optional\[QoE\]](#) qoe_engine=None)
- str [as_overview_table](#) (self, bool sort_by_qoe=True, [Optional\[int\]](#) limit=None)
- str [as_detailed_table](#) (self, bool sort_by_qoe=True, [Optional\[int\]](#) limit=10)
- str [as_visual_breakdown](#) (self, str mac)
- str [as_statistics_summary](#) (self)
- str [as_alerts](#) (self, float threshold=0.4, int limit=5)
- str [as_compact_dashboard](#) (self, int limit=10)
- str [as_full_dashboard](#) (self, int limit=20)
- [show](#) (self, str mode="compact", bool sort_by_qoe=True, [Optional\[int\]](#) limit=None, [Optional\[IO\]](#) pipe=None, bool replace=False, bool disable_color=False)

Public Attributes

- `db` = qoedb
- `engine` = qoe_engine
- bool `use_color` = True

Static Public Attributes

- dict `COLORS`
- dict `BOX`

Protected Member Functions

- str `_colorize` (self, str text, str color)
- str `_qoe_color` (self, float qoe)
- str `_qoe_status` (self, float qoe)
- str `_trend_symbol` (self, str trend)
- str `_bar_chart` (self, float value, int width=20, str filled_char="...", str empty_char="...")
- str `_render_header` (self, str title, int width)
- str `_render_table_row` (self, List[str] columns, List[int] widths, str separator="...")

8.40.1 Detailed Description

Comprehensive QoE dashboard with component breakdown, trends, and alerts.

Features:

- Overall QoE scores with color-coded status
- Component breakdown (connectivity, signal, throughput, reliability, latency, activity)
- Historical trends (improving/declining/stable)
- Volatility indicators
- Statistics summary
- Problem station alerts

8.40.2 Constructor & Destructor Documentation

8.40.2.1 `__init__()`

```
dashboard.qoe_dashboard.QoEDashboard.__init__ (
    self,
    QoEDB qoedb,
    Optional[QoE] qoe_engine = None)
```

Args:

`qoe_db`: QoE database for scores
`qoe_engine`: Optional QoE engine for component details and history

8.40.3 Member Function Documentation

8.40.3.1 `_bar_chart()`

```
str dashboard.qoe_dashboard.QoEDashboard._bar_chart (
    self,
    float value,
    int width = 20,
    str filled_char = "...",
    str empty_char = "...") [protected]
```

Create a simple bar chart for a 0-1 value.

8.40.3.2 `_colorize()`

```
str dashboard.qoe_dashboard.QoEDashboard._colorize (
    self,
    str text,
    str color) [protected]
```

Apply color to text if colors are enabled.

8.40.3.3 `_qoe_color()`

```
str dashboard.qoe_dashboard.QoEDashboard._qoe_color (
    self,
    float qoe) [protected]
```

Get color based on QoE score.

8.40.3.4 `_qoe_status()`

```
str dashboard.qoe_dashboard.QoEDashboard._qoe_status (
    self,
    float qoe) [protected]
```

Get status emoji/symbol based on QoE score.

8.40.3.5 `_render_header()`

```
str dashboard.qoe_dashboard.QoEDashboard._render_header (
    self,
    str title,
    int width) [protected]
```

Render a box header.

8.40.3.6 `_render_table_row()`

```
str dashboard.qoe_dashboard.QoEDashboard._render_table_row (
    self,
    List[str] columns,
    List[int] widths,
    str separator = "...") [protected]
```

Render a single table row.

8.40.3.7 `_trend_symbol()`

```
str dashboard.qoe_dashboard.QoEDashboard._trend_symbol (
    self,
    str trend) [protected]
```

Get symbol for trend direction.

8.40.3.8 `as_alerts()`

```
str dashboard.qoe_dashboard.QoEDashboard.as_alerts (
    self,
    float threshold = 0.4,
    int limit = 5)
```

Show stations with QoE below threshold (problem stations).

8.40.3.9 `as_compact_dashboard()`

```
str dashboard.qoe_dashboard.QoEDashboard.as_compact_dashboard (
    self,
    int limit = 10)
```

Single-screen compact dashboard with key info.

8.40.3.10 `as_detailed_table()`

```
str dashboard.qoe_dashboard.QoEDashboard.as_detailed_table (
    self,
    bool sort_by_qoe = True,
    Optional[int] limit = 10)
```

Detailed table with component breakdown for each station.

8.40.3.11 as_full_dashboard()

```
str dashboard.qoe_dashboard.QoEDashboard.as_full_dashboard (
    self,
    int limit = 20)
```

Full detailed dashboard.

8.40.3.12 as_overview_table()

```
str dashboard.qoe_dashboard.QoEDashboard.as_overview_table (
    self,
    bool sort_by_qoe = True,
    Optional[int] limit = None)
```

Compact overview table with current QoE scores only.
History, trends, and volatility are removed.

8.40.3.13 as_statistics_summary()

```
str dashboard.qoe_dashboard.QoEDashboard.as_statistics_summary (
    self)
```

Verbose statistics summary based only on current QoE values.
No history or trend info.

8.40.3.14 as_visual_breakdown()

```
str dashboard.qoe_dashboard.QoEDashboard.as_visual_breakdown (
    self,
    str mac)
```

Visual bar chart breakdown for a single station.

8.40.3.15 show()

```
dashboard.qoe_dashboard.QoEDashboard.show (
    self,
    str mode = "compact",
    bool sort_by_qoe = True,
    Optional[int] limit = None,
    Optional[IO] pipe = None,
    bool replace = False,
    bool disable_color = False)
```

Display dashboard to pipe OR socket OR stdout.

Args:

mode: "compact", "full", "overview", "detailed", "stats", or "alerts"
 sort_by_qoe: Sort stations by QoE score
 limit: Max number of stations to show
 pipe: Output destination (socket, file, or None for stdout)
 replace: Clear screen before output (ANSI escape codes)
 disable_color: Disable color output

8.40.4 Member Data Documentation

8.40.4.1 BOX

```
dict dashboard.qoe_dashboard.QoEDashboard.BOX [static]
```

Initial value:

```
= {
    "tl": "...", "tr": "...", "bl": "...", "br": "...",
    "h": "...", "v": "...",
    "t": "...", "b": "...", "l": "...", "r": "...",
    "cross": "...",
    "vl": "...", "vr": "...", "ht": "...", "hb": "...",
}
```

8.40.4.2 COLORS

```
dict dashboard.qoe_dashboard.QoEDashboard.COLORS [static]
```

Initial value:

```
= {
    "red": "\033[91m",
    "yellow": "\033[93m",
    "green": "\033[92m",
    "blue": "\033[94m",
    "cyan": "\033[96m",
    "magenta": "\033[95m",
    "white": "\033[97m",
    "gray": "\033[90m",
    "bold": "\033[1m",
    "reset": "\033[0m",
}
```

8.40.4.3 db

```
dashboard.qoe_dashboard.QoEDashboard.db = qoedb
```

8.40.4.4 engine

```
dashboard.qoe_dashboard.QoEDashboard.engine = qoe_engine
```

8.40.4.5 use_color

```
bool dashboard.qoe_dashboard.QoEDashboard.use_color = True
```

The documentation for this class was generated from the following file:

- [dashboard/qoe_dashboard.py](#)

8.41 db.qoe_db.QoEDB Class Reference

Public Member Functions

- `__new__` (cls)
- `__init__` (self)
- `set` (self, str sta_mac, float qoe_value)
- Optional[float] `get` (self, str sta_mac)
- `remove` (self, str sta_mac)
- Dict[str, float] `all` (self)
- int `count` (self)
- `clear` (self)
- Dict[str, float] `to_dict` (self)
- bool `__contains__` (self, str sta_mac)
- `__len__` (self)
- `__iter__` (self)
- `__repr__` (self)

Protected Attributes

- dict `_db` = {}
- bool `_initialized` = True

Static Protected Attributes

- `_instance` = None
- `_lock` = RLock()

8.41.1 Detailed Description

Database for storing QoE (Quality of Experience) for each station.

8.41.2 Constructor & Destructor Documentation

8.41.2.1 `__init__()`

```
db.qoe_db.QoEDB.__init__ (
    self)
```

8.41.3 Member Function Documentation

8.41.3.1 `__contains__()`

```
bool db.qoe_db.QoEDB.__contains__ (
    self,
    str sta_mac)
```

8.41.3.2 __iter__()

```
db.qoe_db.QoEDB.__iter__ (
    self)
```

Iterate over all (sta_mac, qoe) pairs.

8.41.3.3 __len__()

```
db.qoe_db.QoEDB.__len__ (
    self)
```

8.41.3.4 __new__()

```
db.qoe_db.QoEDB.__new__ (
    cls)
```

8.41.3.5 __repr__()

```
db.qoe_db.QoEDB.__repr__ (
    self)
```

8.41.3.6 all()

```
Dict[str, float] db.qoe_db.QoEDB.all (
    self)
```

Return all QoE entries.

8.41.3.7 clear()

```
db.qoe_db.QoEDB.clear (
    self)
```

Clear all QoE entries.

8.41.3.8 count()

```
int db.qoe_db.QoEDB.count (
    self)
```

Number of stations with QoE recorded.

8.41.3.9 get()

```
Optional[float] db.qoe_db.QoEDB.get (
    self,
    str sta_mac)
```

Get QoE for a station. Returns None if not set.

8.41.3.10 remove()

```
db.qoe_db.QoEDB.remove (
    self,
    str sta_mac)
```

Remove QoE entry for a station.

8.41.3.11 set()

```
db.qoe_db.QoEDB.set (
    self,
    str sta_mac,
    float qoe_value)
```

Set or update QoE for a station.

8.41.3.12 to_dict()

```
Dict[str, float] db.qoe_db.QoEDB.to_dict (
    self)
```

Dump the complete state of the database.

Returns a dictionary mapping station MAC addresses to their QoE value.

8.41.4 Member Data Documentation**8.41.4.1 _db**

```
db.qoe_db.QoEDB._db = {} [protected]
```

8.41.4.2 _initialized

```
bool db.qoe_db.QoEDB._initialized = True [protected]
```

8.41.4.3 `_instance`

```
db.qoe_db.QoEDB._instance = None [static], [protected]
```

8.41.4.4 `_lock`

```
db.qoe_db.QoEDB._lock = RLock() [static], [protected]
```

The documentation for this class was generated from the following file:

- db/qoe_db.py

8.42 metrics.qoe.QoEHistory Class Reference

Public Member Functions

- `add` (self, float score)
- float `average` (self)
- float `smoothed` (self)
- str `trend` (self)
- float `volatility` (self)

Static Public Attributes

- deque `history` = field(default_factory=lambda: deque(maxlen=60))
- float `alpha` = 0.3

Protected Member Functions

- float `_smoothed_for_list` (self, list data)

8.42.1 Detailed Description

Track QoE over time for trend analysis.

8.42.2 Member Function Documentation

8.42.2.1 `_smoothed_for_list()`

```
float metrics.qoe.QoEHistory._smoothed_for_list (
    self,
    list data) [protected]
```

Compute exponential smoothing for a given slice of history.

8.42.2.2 add()

```
metrics.qoe.QoEHistory.add (
    self,
    float score)
```

8.42.2.3 average()

```
float metrics.qoe.QoEHistory.average (
    self)
```

8.42.2.4 smoothed()

```
float metrics.qoe.QoEHistory.smoothed (
    self)
```

Exponential smoothing of the QoE scores.

8.42.2.5 trend()

```
str metrics.qoe.QoEHistory.trend (
    self)
```

Detect if QoE is improving, declining, or stable using smoothed scores.

8.42.2.6 volatility()

```
float metrics.qoe.QoEHistory.volatility (
    self)
```

Measure how much QoE fluctuates (standard deviation).

8.42.3 Member Data Documentation

8.42.3.1 alpha

```
float metrics.qoe.QoEHistory.alpha = 0.3 [static]
```

8.42.3.2 history

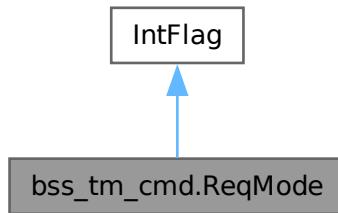
```
metrics.qoe.QoEHistory.history = field(default_factory=lambda: deque(maxlen=60)) [static]
```

The documentation for this class was generated from the following file:

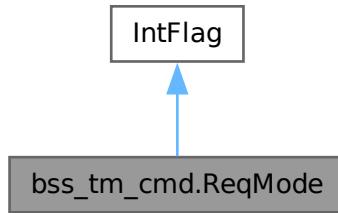
- [metrics/qoe.py](#)

8.43 bss_tm_cmd.ReqMode Class Reference

Inheritance diagram for bss_tm_cmd.ReqMode:



Collaboration diagram for bss_tm_cmd.ReqMode:



Static Public Attributes

- int [PREFERRED_CAND_LIST_INCLUDED](#) = 0x01
- int [ABRUPT_TRANSITION](#) = 0x02
- int [DISASSOC_IMMINENT](#) = 0x04
- int [BSS_TERMINATION_INCLUDED](#) = 0x08
- int [ESS_DISASSOC_IMMINENT](#) = 0x10
- int [CANDIDATE_LIST_PROVIDED_BY_STA](#) = 0x20

8.43.1 Detailed Description

IEEE 802.11v BSS Transition Management Request Mode bits.

8.43.2 Member Data Documentation

8.43.2.1 ABRUPT_TRANSITION

```
int bss_tm_cmd.ReqMode.ABRUPT_TRANSITION = 0x02 [static]
```

8.43.2.2 BSS_TERMINATION_INCLUDED

```
int bss_tm_cmd.ReqMode.BSS_TERMINATION_INCLUDED = 0x08 [static]
```

8.43.2.3 CANDIDATE_LIST_PROVIDED_BY_STA

```
int bss_tm_cmd.ReqMode.CANDIDATE_LIST_PROVIDED_BY_STA = 0x20 [static]
```

8.43.2.4 DISASSOC_IMMINENT

```
int bss_tm_cmd.ReqMode.DISASSOC_IMMINENT = 0x04 [static]
```

8.43.2.5 ESS_DISASSOC_IMMINENT

```
int bss_tm_cmd.ReqMode.ESS_DISASSOC_IMMINENT = 0x10 [static]
```

8.43.2.6 PREFERRED_CAND_LIST_INCLUDED

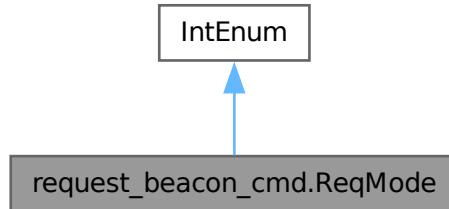
```
int bss_tm_cmd.ReqMode.PREFERRED_CAND_LIST_INCLUDED = 0x01 [static]
```

The documentation for this class was generated from the following file:

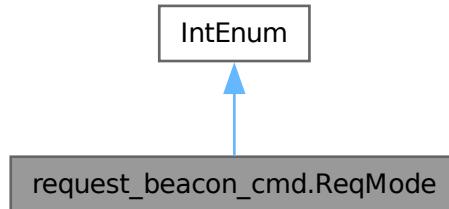
- command/[bss_tm_cmd.py](#)

8.44 request_beacon_cmd.ReqMode Class Reference

Inheritance diagram for request_beacon_cmd.ReqMode:



Collaboration diagram for request_beacon_cmd.ReqMode:



Static Public Attributes

- int **NORMAL** = 0
- int **LCI** = 1 << 0
- int **CIVIC** = 1 << 1

8.44.1 Detailed Description

Request modes for REQ_BEACON command.

8.44.2 Member Data Documentation

8.44.2.1 CIVIC

```
int request_beacon_cmd.ReqMode.CIVIC = 1 << 1 [static]
```

8.44.2.2 LCI

```
int request_beacon_cmd.ReqMode.LCI = 1 << 0 [static]
```

8.44.2.3 NORMAL

```
int request_beacon_cmd.ReqMode.NORMAL = 0 [static]
```

The documentation for this class was generated from the following file:

- command/[request_beacon_cmd.py](#)

8.45 request_beacon_cmd.RequestBeaconCommandBuilder Class Reference

Public Member Functions

- [__init__](#) (self, str `dest_mac`= "")
- [set_req_mode](#) (self, int mode)
- [set_measurement_params](#) (self, int `operating_class`, int `channel_number`, int `randomization_interval`, int `measurement_duration`, int `measurement_mode`, str `bssid`)
- [add_subelements](#) (self, bytes data)
- str [build](#) (self)
- str [__str__](#) (self)

Public Attributes

- `dest_mac` = `dest_mac`
- int `req_mode` = 0
- int `operating_class` = 0
- int `channel_number` = 0
- int `randomization_interval` = 0
- int `measurement_duration` = 0
- int `measurement_mode` = 0
- str `bssid` = b"\xff\xff\xff\xff\x00\x00"
- str `subelements` = b"

Protected Member Functions

- bytes [_build_payload](#) (self)

8.45.1 Detailed Description

Build a REQ_BEACON command for hostapd from human-readable parameters.

8.45.2 Constructor & Destructor Documentation

8.45.2.1 __init__()

```
request_beacon_cmd.RequestBeaconCommandBuilder.__init__ (
    self,
    str dest_mac = "")
```

8.45.3 Member Function Documentation

8.45.3.1 __str__()

```
str request_beacon_cmd.RequestBeaconCommandBuilder.__str__ (
    self)
```

8.45.3.2 _build_payload()

```
bytes request_beacon_cmd.RequestBeaconCommandBuilder._build_payload (
    self) [protected]
```

Assemble payload binary per IEEE 802.11k spec.

8.45.3.3 add_subelements()

```
request_beacon_cmd.RequestBeaconCommandBuilder.add_subelements (
    self,
    bytes data)
```

Optional variable-length subelements (raw bytes).

8.45.3.4 build()

```
str request_beacon_cmd.RequestBeaconCommandBuilder.build (
    self)
```

Return the final REQ_BEACON command string for hostapd.

8.45.3.5 set_measurement_params()

```
request_beacon_cmd.RequestBeaconCommandBuilder.set_measurement_params (
    self,
    int operating_class,
    int channel_number,
    int randomization_interval,
    int measurement_duration,
    int measurement_mode,
    str bssid)
```

All standard fields from IEEE 802.11k Beacon Request body.

8.45.3.6 `set_req_mode()`

```
request_beacon_cmd.RequestBeaconCommandBuilder.set_req_mode (
    self,
    int mode)
```

8.45.4 Member Data Documentation

8.45.4.1 `bssid`

```
request_beacon_cmd.RequestBeaconCommandBuilder.bssid = b'\xff\xff\xff\xff\xff\xff\xff'
```

8.45.4.2 `channel_number`

```
int request_beacon_cmd.RequestBeaconCommandBuilder.channel_number = 0
```

8.45.4.3 `dest_mac`

```
request_beacon_cmd.RequestBeaconCommandBuilder.dest_mac = dest_mac
```

8.45.4.4 `measurement_duration`

```
int request_beacon_cmd.RequestBeaconCommandBuilder.measurement_duration = 0
```

8.45.4.5 `measurement_mode`

```
int request_beacon_cmd.RequestBeaconCommandBuilder.measurement_mode = 0
```

8.45.4.6 `operating_class`

```
int request_beacon_cmd.RequestBeaconCommandBuilder.operating_class = 0
```

8.45.4.7 `randomization_interval`

```
int request_beacon_cmd.RequestBeaconCommandBuilder.randomization_interval = 0
```

8.45.4.8 `req_mode`

```
int request_beacon_cmd.RequestBeaconCommandBuilder.req_mode = 0
```

8.45.4.9 subelements

```
request_beacon_cmd.RequestBeaconCommandBuilder.subelements = b''
```

The documentation for this class was generated from the following file:

- command/[request_beacon_cmd.py](#)

8.46 store.routine.Routine Class Reference

Public Member Functions

- `__init__` (self, str `output_dir`, Optional[Dict[str, str]] `db_initials`=None, float `batch_interval`=30.0, Optional[int] `retention_days`=None, str `organize_by`="date" # "date", hour, or, flat)
- `stop` (self, bool `save_final`=True)
- Dict[str, Any] `get_statistics` (self)
- Dict[str, Any] `force_save` (self)
- Dict[str, Any] `get_latest_snapshot` (self)
- list `list_saved_batches` (self, int `limit`=10)

Public Attributes

- `output_dir` = Path(`output_dir`)
- str `metadata_dir` = self.`output_dir` / "_metadata"
- `db_initials`
- dict `databases`
- `batch_interval` = batch_interval
- `retention_days` = retention_days
- str `organize_by` = organize_by

Protected Member Functions

- Path `_get_organized_path` (self, datetime timestamp)
- str `_generate_filename` (self, str `db_name`, datetime timestamp)
- Optional[Dict[str, Any]] `_get_db_snapshot` (self, str `db_name`, Any `db_obj`, datetime timestamp)
- Dict[str, Any] `_save_batch` (self)
- `_save_batch_metadata` (self, Dict[str, Any] `metadata`, Path `batch_dir`)
- `_save_session_metadata` (self)
- `_cleanup_old_batches` (self)
- `_run` (self)

Protected Attributes

- `_stop_event` = threading.Event()
- `_lock` = threading.Lock()
- int `_batch_counter` = 0
- `_session_id` = datetime.now().strftime("%Y%m%d_%H%M%S")
- int `_save_errors` = 0
- int `_total_saves` = 0
- dict `_session_metadata`
- `_thread` = threading.Thread(target=self._run, daemon=True, name="RoutineThread")

8.46.1 Constructor & Destructor Documentation

8.46.1.1 `__init__()`

```
store.routine.Routine.__init__ (
    self,
    str output_dir,
    Optional[Dict[str, str]] db_initials = None,
    float batch_interval = 30.0,
    Optional[int] retention_days = None,
    str organize_by = "date" # "date",
    hour,
    or,
    flat)
```

Enhanced database persistence routine with organized timestamped storage.

Args:

- output_dir: Root directory for database storage
- db_initials: Dictionary mapping db names to filename initials
- batch_interval: How often (seconds) to persist a batch
- retention_days: Auto-delete batches older than this (None = keep all)
- organize_by: How to organize files - "date" (YYYY/MM/DD/), "hour" (YYYY/MM/DD/HH/), or "flat"

8.46.2 Member Function Documentation

8.46.2.1 `_cleanup_old_batches()`

```
store.routine.Routine._cleanup_old_batches (
    self) [protected]
```

Remove batches older than retention_days.

8.46.2.2 `_generate_filename()`

```
str store.routine.Routine._generate_filename (
    self,
    str db_name,
    datetime timestamp) [protected]
```

Generate organized filename with timestamp.
Format: {initial}_{YYYYMMDD_HHMMSS}_{batch}.json
Example: BM_20251115_143022_0042.json

8.46.2.3 `_get_db_snapshot()`

```
Optional[Dict[str, Any]] store.routine.Routine._get_db_snapshot (
    self,
    str db_name,
    Any db_obj,
    datetime timestamp) [protected]
```

Get a snapshot of a database with full metadata.

8.46.2.4 `_get_organized_path()`

```
Path store.routine.Routine._get_organized_path (
    self,
    datetime timestamp) [protected]
```

Get organized directory path based on timestamp.

Returns path like:

- date: output_dir/2025/11/15/
- hour: output_dir/2025/11/15/14/
- flat: output_dir/

8.46.2.5 `_run()`

```
store.routine.Routine._run (
    self) [protected]
```

Main routine loop.

8.46.2.6 `_save_batch()`

```
Dict[str, Any] store.routine.Routine._save_batch (
    self) [protected]
```

Save all database snapshots with metadata tracking.

8.46.2.7 `_save_batch_metadata()`

```
store.routine.Routine._save_batch_metadata (
    self,
    Dict[str, Any] metadata,
    Path batch_dir) [protected]
```

Save metadata for a specific batch.

8.46.2.8 `_save_session_metadata()`

```
store.routine.Routine._save_session_metadata (
    self) [protected]
```

Save overall session metadata.

8.46.2.9 `force_save()`

```
Dict[str, Any] store.routine.Routine.force_save (
    self)
```

Manually trigger an immediate save.

8.46.2.10 `get_latest_snapshot()`

```
Dict[str, Any] store.routine.Routine.get_latest_snapshot (
    self)
```

Get current in-memory snapshots without saving.

8.46.2.11 `get_statistics()`

```
Dict[str, Any] store.routine.Routine.get_statistics (
    self)
```

Get runtime statistics.

8.46.2.12 `list_saved_batches()`

```
list store.routine.Routine.list_saved_batches (
    self,
    int limit = 10)
```

List recent saved batches with metadata.

8.46.2.13 `stop()`

```
store.routine.Routine.stop (
    self,
    bool save_final = True)
```

Stop the routine and save final metadata.

8.46.3 Member Data Documentation

8.46.3.1 `_batch_counter`

```
store.routine.Routine._batch_counter = 0 [protected]
```

8.46.3.2 lock

```
store.routine.Routine._lock = threading.Lock() [protected]
```

8.46.3.3 save_errors

```
store.routine.Routine._save_errors = 0 [protected]
```

8.46.3.4 session_id

```
store.routine.Routine._session_id = datetime.now().strftime("%Y%m%d_%H%M%S") [protected]
```

8.46.3.5 session_metadata

```
store.routine.Routine._session_metadata [protected]
```

Initial value:

```
= {
    "session_id": self._session_id,
    "start_time": datetime.now().isoformat(),
    "databases": list(self.databases.keys()),
    "config": {
        "batch_interval": batch_interval,
        "organize_by": organize_by,
        "retention_days": retention_days
    },
    "saves": []
}
```

8.46.3.6 stop_event

```
store.routine.Routine._stop_event = threading.Event() [protected]
```

8.46.3.7 thread

```
store.routine.Routine._thread = threading.Thread(target=self._run, daemon=True, name="Routine<→Thread") [protected]
```

8.46.3.8 total_saves

```
store.routine.Routine._total_saves = 0 [protected]
```

8.46.3.9 batch_interval

```
store.routine.Routine.batch_interval = batch_interval
```

8.46.3.10 databases

```
dict store.routine.Routine.databases
```

Initial value:

```
= {
    "bmdb": BeaconMeasurementDB(),
    "lmdb": LinkMeasurementDB(),
    "qoedb": QoEDB(),
    "stdb": StationDB(),
    "neighbordb": NeighborDB(),
    "bsstmdb": BSSTransitionResponseDB(),
}
```

8.46.3.11 db_initials

```
store.routine.Routine.db_initials
```

Initial value:

```
= db_initials or {
    "bmdb": "BM",
    "lmdb": "LM",
    "qoedb": "QOE",
    "stdb": "ST",
    "neighbordb": "NB",
    "bsstmdb": "BSSTM",
}
```

8.46.3.12 metadata_dir

```
str store.routine.Routine.metadata_dir = self.output_dir / "_metadata"
```

8.46.3.13 organize_by

```
str store.routine.Routine.organize_by = organize_by
```

8.46.3.14 output_dir

```
store.routine.Routine.output_dir = Path(output_dir)
```

8.46.3.15 retention_days

```
store.routine.Routine.retention_days = retention_days
```

The documentation for this class was generated from the following file:

- [store/routine.py](#)

8.47 rxmlux.RxMux Class Reference

Public Member Functions

- None [__init__](#) (*self*)
- [cleardb](#) (*self*, str *mac*)
- Optional[Tuple[[MgmtType](#), [RadioTap](#)]] [mux](#) (*self*, bytes *frame_bytes*)

Static Public Member Functions

- bytes [parse_buf_string](#) (str *s*)

Public Attributes

- *lm_db* = [LinkMeasurementDB](#)()
- *bm_db* = [BeaconMeasurementDB](#)()
- *bss_tm_db* = [BSSTransitionResponseDB](#)()
- *st_db* = [StationDB](#)()
- *qe_db* = [QoEDB](#)()
- *nr_db* = [NeighborRankingDB](#)()

8.47.1 Detailed Description

Multiplex incoming 802.11 frames into specific storages based on Action frame category.

8.47.2 Constructor & Destructor Documentation

8.47.2.1 __init__()

```
None rxmlux.RxMux.__init__ (
    self)
```

8.47.3 Member Function Documentation

8.47.3.1 cleardb()

```
rxmlux.RxMux.cleardb (
    self,
    str mac)
```

8.47.3.2 mux()

```
Optional[Tuple[MgmtType, RadioTap]] rxmlux.RxMux.mux (
    self,
    bytes frame_bytes)
```

Parse a raw 802.11 frame and store in the appropriate DB.

8.47.3.3 `parse_buf_string()`

```
bytes rxmux.RxMux.parse_buf_string (
    str s) [static]
```

Extract buf= hex string and return bytes.

8.47.4 Member Data Documentation

8.47.4.1 `bm_db`

```
rxmux.RxMux.bm_db = BeaconMeasurementDB()
```

8.47.4.2 `bss_tm_db`

```
rxmux.RxMux.bss_tm_db = BSSTransitionResponseDB()
```

8.47.4.3 `lm_db`

```
rxmux.RxMux.lm_db = LinkMeasurementDB()
```

8.47.4.4 `nr_db`

```
rxmux.RxMux.nr_db = NeighborRankingDB()
```

8.47.4.5 `qe_db`

```
rxmux.RxMux.qe_db = QoEDB()
```

8.47.4.6 `st_db`

```
rxmux.RxMux.st_db = StationDB()
```

The documentation for this class was generated from the following file:

- protocol/[rxmux.py](#)

8.48 dashboard.socket_pool.SocketPool Class Reference

Public Member Functions

- `__init__` (self)
- socket.socket `create` (self, str name, str path, str mode="server")
- Optional[ClientConnection] `accept` (self, str name, Optional[str] client_name=None)
- Optional[ClientConnection] `get_client` (self, str client_name)
- List[ClientConnection] `get_clients` (self, str server_name)
- `close_client` (self, str client_name)
- `broadcast` (self, str server_name, bytes data)
- Optional[socket.socket] `get` (self, str name)
- `close` (self, str name)
- `destroy` (self)
- List[str] `list` (self)
- List[str] `list_clients` (self, Optional[str] server_name=None)
- Dict `stats` (self)
- `__len__` (self)
- `__repr__` (self)

Protected Attributes

- dict `_sockets` = {}
- dict `_clients` = {}
- dict `_client_lookup` = {}
- `_lock` = threading.RLock()
- int `_client_counter` = 0

8.48.1 Detailed Description

Manages multiple UNIX domain sockets for IPC (server + client) with client tracking.

8.48.2 Constructor & Destructor Documentation

8.48.2.1 `__init__()`

```
dashboard.socket_pool.SocketPool.__init__ (
    self)
```

8.48.3 Member Function Documentation

8.48.3.1 `__len__()`

```
dashboard.socket_pool.SocketPool.__len__ (
    self)
```

8.48.3.2 __repr__()

```
dashboard.socket_pool.SocketPool.__repr__ (
    self)
```

8.48.3.3 accept()

```
Optional[ClientConnection] dashboard.socket_pool.SocketPool.accept (
    self,
    str name,
    Optional[str] client_name = None)
```

Block until a client connects to a server socket.

Returns a ClientConnection object that can be used to communicate with the client.

Args:

name: server socket name
client_name: optional name for the client connection (auto-generated if None)

8.48.3.4 broadcast()

```
dashboard.socket_pool.SocketPool.broadcast (
    self,
    str server_name,
    bytes data)
```

Send data to all clients connected to a server.

8.48.3.5 close()

```
dashboard.socket_pool.SocketPool.close (
    self,
    str name)
```

8.48.3.6 close_client()

```
dashboard.socket_pool.SocketPool.close_client (
    self,
    str client_name)
```

Close and remove a specific client connection.

8.48.3.7 create()

```
socket.socket dashboard.socket_pool.SocketPool.create (
    self,
    str name,
    str path,
    str mode = "server")
```

Create a UNIX domain socket.

Args:

```
    name: logical handle
    path: path on filesystem
    mode: "server" or "client"
```

8.48.3.8 destroy()

```
dashboard.socket_pool.SocketPool.destroy (
    self)
```

8.48.3.9 get()

```
Optional[socket.socket] dashboard.socket_pool.SocketPool.get (
    self,
    str name)
```

8.48.3.10 get_client()

```
Optional[ClientConnection] dashboard.socket_pool.SocketPool.get_client (
    self,
    str client_name)
```

Get a client connection by name.

8.48.3.11 get_clients()

```
List[ClientConnection] dashboard.socket_pool.SocketPool.get_clients (
    self,
    str server_name)
```

Get all clients connected to a server.

8.48.3.12 list()

```
List[str] dashboard.socket_pool.SocketPool.list (
    self)
```

8.48.3.13 list_clients()

```
List[str] dashboard.socket_pool.SocketPool.list_clients (
    self,
    Optional[str] server_name = None)
```

List all client connection names, optionally filtered by server.

8.48.3.14 stats()

```
Dict dashboard.socket_pool.SocketPool.stats (
    self)
```

Get statistics about the socket pool.

8.48.4 Member Data Documentation

8.48.4.1 _client_counter

```
int dashboard.socket_pool.SocketPool._client_counter = 0 [protected]
```

8.48.4.2 _client_lookup

```
dashboard.socket_pool.SocketPool._client_lookup = {} [protected]
```

8.48.4.3 _clients

```
dict dashboard.socket_pool.SocketPool._clients = {} [protected]
```

8.48.4.4 _lock

```
dashboard.socket_pool.SocketPool._lock = threading.RLock() [protected]
```

8.48.4.5 _sockets

```
dashboard.socket_pool.SocketPool._sockets = {} [protected]
```

The documentation for this class was generated from the following file:

- [dashboard/socket_pool.py](#)

8.49 api.stateapi.StateAPI Class Reference

Public Member Functions

- `__init__ (self)`
- `Dict build_station_api_dict (self, Station station, Optional[LinkMeasurement] lm=None)`
- `Dict[str, Any] req (self)`
- `str json (self)`
- `serve (self, str host="0.0.0.0", int port=8080)`

Public Attributes

- `stdb = StationDB()`
- `lmdb = LinkMeasurementDB()`
- `qoe = QoE()`
- `str path = "/" or self.path.startswith("/api"):`

8.49.1 Constructor & Destructor Documentation

8.49.1.1 __init__()

```
api.stateapi.StateAPI.__init__ (
    self)
```

8.49.2 Member Function Documentation

8.49.2.1 build_station_api_dict()

```
Dict api.stateapi.StateAPI.build_station_api_dict (
    self,
    Station station,
    Optional[LinkMeasurement] lm = None)
```

Generate API-friendly dict with key station metrics and QoE.

8.49.2.2 json()

```
str api.stateapi.StateAPI.json (
    self)
```

8.49.2.3 req()

```
Dict[str, Any] api.stateapi.StateAPI.req (
    self)
```

8.49.2.4 serve()

```
api.stateapi.StateAPI.serve (
    self,
    str host = "0.0.0.0",
    int port = 8080)
```

Serve the StateAPI on a simple HTTP server, responding with the JSON API data.

8.49.3 Member Data Documentation

8.49.3.1 lmdb

```
api.stateapi.StateAPI.lmdb = LinkMeasurementDB()
```

8.49.3.2 path

```
str api.stateapi.StateAPI.path = "/" or self.path.startswith("/api"):
```

8.49.3.3 qoe

```
api.stateapi.StateAPI.qoe = QoE()
```

8.49.3.4 stdb

```
api.stateapi.StateAPI.stdB = StationDB()
```

The documentation for this class was generated from the following file:

- [api/stateapi.py](#)

8.50 model.station.Station Class Reference

Public Member Functions

- [__init__\(self\)](#)
- [dict\[str, Any\] to_dict\(self\)](#)
- [str __str__\(self\)](#)

Public Attributes

- dict `info_dict` = {}
- str|None `raw` = None
- str|None `mac` = None
- list `flags` = []
- int|None `aid` = None
- list[str]|None `capability` = None
- int|None `listen_interval` = None
- list[float]|None `supported_rates` = None
- str|None `timeout_next` = None
- int|None `rx_packets` = None
- int|None `tx_packets` = None
- int|None `rx_bytes` = None
- int|None `tx_bytes` = None
- int|None `rx_airtime` = None
- int|None `tx_airtime` = None
- int|None `beacons_count` = None
- int|None `rx_drop_misc` = None
- int|None `backlog_packets` = None
- int|None `backlog_bytes` = None
- int|None `fcs_error_count` = None
- int|None `beacon_loss_count` = None
- int|None `expected_throughput` = None
- int|None `tx_retry_count` = None
- int|None `tx_retry_failed` = None
- int|None `tx_bitrate` = None
- int|None `rx_bitrate` = None
- int|None `tx_duration` = None
- int|None `rx_duration` = None
- int|None `rx_mcs` = None
- int|None `tx_mcs` = None
- int|None `rx_vhtmcs` = None
- int|None `tx_vhtmcs` = None
- int|None `rx_he_nss` = None
- int|None `tx_he_nss` = None
- int|None `rx_vht_nss` = None
- int|None `tx_vht_nss` = None
- int|None `rx_dcm` = None
- int|None `tx_dcm` = None
- int|None `rx_guard_interval` = None
- int|None `tx_guard_interval` = None
- int|None `signal` = None
- int|None `avg_signal` = None
- int|None `avg_beacon_signal` = None
- int|None `avg_ack_signal` = None
- int|None `inactive_msec` = None
- int|None `connected_sec` = None
- int|None `rx_rate_info` = None
- int|None `tx_rate_info` = None
- int|None `connected_time` = None
- int|None `mbo_cell_capa` = None
- str|None `supp_op_classes` = None
- int|None `min_txpower` = None
- int|None `max_txpower` = None
- list[str]|None `ext_capab` = None

8.50.1 Detailed Description

Represents the status information of an associated station.

8.50.2 Constructor & Destructor Documentation

8.50.2.1 `__init__()`

```
model.station.Station.__init__ (
    self)
```

8.50.3 Member Function Documentation

8.50.3.1 `__str__()`

```
str model.station.Station.__str__ (
    self)
```

Prettier and multi-column tabular string representation of StationBasicInfo.

8.50.3.2 `to_dict()`

```
dict[str, Any] model.station.Station.to_dict (
    self)
```

Dump the complete state of the Station object.
Returns a dictionary of all attributes.

8.50.4 Member Data Documentation

8.50.4.1 `aid`

```
int | None model.station.Station.aid = None
```

8.50.4.2 `avg_ack_signal`

```
int | None model.station.Station.avg_ack_signal = None
```

8.50.4.3 `avg_beacon_signal`

```
int | None model.station.Station.avg_beacon_signal = None
```

8.50.4.4 avg_signal

```
int | None model.station.Station.avg_signal = None
```

8.50.4.5 backlog_bytes

```
int | None model.station.Station.backlog_bytes = None
```

8.50.4.6 backlog_packets

```
int | None model.station.Station.backlog_packets = None
```

8.50.4.7 beacon_loss_count

```
int | None model.station.Station.beacon_loss_count = None
```

8.50.4.8 beacons_count

```
int | None model.station.Station.beacons_count = None
```

8.50.4.9 capability

```
list[str] | None model.station.Station.capability = None
```

8.50.4.10 connected_sec

```
int | None model.station.Station.connected_sec = None
```

8.50.4.11 connected_time

```
int | None model.station.Station.connected_time = None
```

8.50.4.12 expected_throughput

```
int | None model.station.Station.expected_throughput = None
```

8.50.4.13 ext_capab

```
list[str] | None model.station.Station.ext_capab = None
```

8.50.4.14 fcs_error_count

```
int | None model.station.Station.fcs_error_count = None
```

8.50.4.15 flags

```
list model.station.Station.flags = [ ]
```

8.50.4.16 inactive_msec

```
int | None model.station.Station.inactive_msec = None
```

8.50.4.17 info_dict

```
dict model.station.Station.info_dict = {}
```

8.50.4.18 listen_interval

```
int | None model.station.Station.listen_interval = None
```

8.50.4.19 mac

```
str | None model.station.Station.mac = None
```

8.50.4.20 max_txpower

```
int | None model.station.Station.max_txpower = None
```

8.50.4.21 mbo_cell_capa

```
int | None model.station.Station.mbo_cell_capa = None
```

8.50.4.22 min_txpower

```
int | None model.station.Station.min_txpower = None
```

8.50.4.23 raw

```
str | None model.station.Station.raw = None
```

8.50.4.24 rx_airtime

```
int | None model.station.Station.rx_airtime = None
```

8.50.4.25 rx_bitrate

```
int | None model.station.Station.rx_bitrate = None
```

8.50.4.26 rx_bytes

```
int | None model.station.Station.rx_bytes = None
```

8.50.4.27 rx_dcm

```
int | None model.station.Station.rx_dcm = None
```

8.50.4.28 rx_drop_misc

```
int | None model.station.Station.rx_drop_misc = None
```

8.50.4.29 rx_duration

```
int | None model.station.Station.rx_duration = None
```

8.50.4.30 rx_guard_interval

```
int | None model.station.Station.rx_guard_interval = None
```

8.50.4.31 rx_he_nss

```
int | None model.station.Station.rx_he_nss = None
```

8.50.4.32 rx_mcs

```
int | None model.station.Station.rx_mcs = None
```

8.50.4.33 rx_packets

```
int | None model.station.Station.rx_packets = None
```

8.50.4.34 rx_rate_info

```
int | None model.station.Station.rx_rate_info = None
```

8.50.4.35 rx_vht_nss

```
int | None model.station.Station.rx_vht_nss = None
```

8.50.4.36 rx_vhtmcs

```
int | None model.station.Station.rx_vhtmcs = None
```

8.50.4.37 signal

```
int | None model.station.Station.signal = None
```

8.50.4.38 supp_op_classes

```
str | None model.station.Station.supp_op_classes = None
```

8.50.4.39 supported_rates

```
list[float] | None model.station.Station.supported_rates = None
```

8.50.4.40 timeout_next

```
str | None model.station.Station.timeout_next = None
```

8.50.4.41 tx_airtime

```
int | None model.station.Station.tx_airtime = None
```

8.50.4.42 tx_bitrate

```
int | None model.station.Station.tx_bitrate = None
```

8.50.4.43 tx_bytes

```
int | None model.station.Station.tx_bytes = None
```

8.50.4.44 tx_dcm

```
int | None model.station.Station.tx_dcm = None
```

8.50.4.45 tx_duration

```
int | None model.station.Station.tx_duration = None
```

8.50.4.46 tx_guard_interval

```
int | None model.station.Station.tx_guard_interval = None
```

8.50.4.47 tx_he_nss

```
int | None model.station.Station.tx_he_nss = None
```

8.50.4.48 tx_mcs

```
int | None model.station.Station.tx_mcs = None
```

8.50.4.49 tx_packets

```
int | None model.station.Station.tx_packets = None
```

8.50.4.50 tx_rate_info

```
int | None model.station.Station.tx_rate_info = None
```

8.50.4.51 tx_retry_count

```
int | None model.station.Station.tx_retry_count = None
```

8.50.4.52 tx_retry_failed

```
int | None model.station.Station.tx_retry_failed = None
```

8.50.4.53 tx_vht_nss

```
int | None model.station.Station.tx_vht_nss = None
```

8.50.4.54 tx_vhtmcs

```
int | None model.station.Station.tx_vhtmcs = None
```

The documentation for this class was generated from the following file:

- [model/station.py](#)

8.51 dashboard.station_dashboard.StationDashboard Class Reference

Public Member Functions

- [__init__](#) (self, [StationDB](#) stationdb)
- [show](#) (self, Optional[IO] pipe_out=None, Optional[IO] pipe_in=None, bool replace=False, **kwargs)

Public Attributes

- [db](#) = stationdb
- int [index](#) = 0

Protected Member Functions

- str [_render_station](#) (self, [Station](#) station, int idx, int total)
- [_handle_command](#) (self, str cmd, list[[Station](#)] stations)
- [_write](#) (self, Optional[IO] out, str text, bool replace)

8.51.1 Detailed Description

Display 1 station at a time.
Supports interactive navigation through pipe/socket input.

8.51.2 Constructor & Destructor Documentation

8.51.2.1 __init__()

```
dashboard.station_dashboard.StationDashboard.__init__ (
    self,
    StationDB stationdb)
```

8.51.3 Member Function Documentation

8.51.3.1 _handle_command()

```
dashboard.station_dashboard.StationDashboard._handle_command (
    self,
    str cmd,
    list[Station] stations) [protected]
```

8.51.3.2 `_render_station()`

```
str dashboard.station_dashboard.StationDashboard._render_station (
    self,
    Station station,
    int idx,
    int total) [protected]
```

8.51.3.3 `_write()`

```
dashboard.station_dashboard.StationDashboard._write (
    self,
    Optional[IO] out,
    str text,
    bool replace) [protected]
```

8.51.3.4 `show()`

```
dashboard.station_dashboard.StationDashboard.show (
    self,
    Optional[IO] pipe_out = None,
    Optional[IO] pipe_in = None,
    bool replace = False,
    **kwargs)
```

8.51.4 Member Data Documentation

8.51.4.1 `db`

```
dashboard.station_dashboard.StationDashboard.db = stationdb
```

8.51.4.2 `index`

```
int dashboard.station_dashboard.StationDashboard.index = 0
```

The documentation for this class was generated from the following file:

- dashboard/[station_dashboard.py](#)

8.52 db.station_db.StationDB Class Reference

Public Member Functions

- `__new__` (cls)
- `__init__` (self)
- `add` (self, Station station)
- Optional[Station] `get` (self, str mac)
- `remove` (self, str mac)
- list[Station] `all` (self)
- list[str] `list` (self)
- int `count` (self)
- `clear` (self)
- `update` (self, str mac, dict info)
- Dict[str, dict] `to_dict` (self)
- bool `__contains__` (self, str mac)
- `__len__` (self)
- `__iter__` (self)
- `__repr__` (self)

Protected Attributes

- dict `_stations` = {}
- bool `_initialized` = True

Static Protected Attributes

- `_instance` = None
- `_lock` = RLock()

8.52.1 Detailed Description

Singleton database for managing Station objects.

8.52.2 Constructor & Destructor Documentation

8.52.2.1 `__init__()`

```
db.station_db.StationDB.__init__ (
    self)
```

8.52.3 Member Function Documentation

8.52.3.1 `__contains__()`

```
bool db.station_db.StationDB.__contains__ (
    self,
    str mac)
```

8.52.3.2 __iter__()

```
db.station_db.StationDB.__iter__ (
    self)
```

8.52.3.3 __len__()

```
db.station_db.StationDB.__len__ (
    self)
```

8.52.3.4 __new__()

```
db.station_db.StationDB.__new__ (
    cls)
```

8.52.3.5 __repr__()

```
db.station_db.StationDB.__repr__ (
    self)
```

8.52.3.6 add()

```
db.station_db.StationDB.add (
    self,
    Station station)
```

Add or update a Station entry by MAC address.

8.52.3.7 all()

```
list[Station] db.station_db.StationDB.all (
    self)
```

Return all Station entries.

8.52.3.8 clear()

```
db.station_db.StationDB.clear (
    self)
```

Remove all Station entries.

8.52.3.9 count()

```
int db.station_db.StationDB.count (
    self)
```

Return total number of stations.

8.52.3.10 get()

```
Optional[Station] db.station_db.StationDB.get (
    self,
    str mac)
```

Retrieve a station by MAC address.

8.52.3.11 list()

```
list[str] db.station_db.StationDB.list (
    self)
```

Return list of MAC addresses for all stations.

8.52.3.12 remove()

```
db.station_db.StationDB.remove (
    self,
    str mac)
```

Remove a Station entry.

8.52.3.13 to_dict()

```
Dict[str, dict] db.station_db.StationDB.to_dict (
    self)
```

Dump the complete state of the database.

Returns a dictionary mapping lowercased station MAC addresses to their dictionary representations (calls Station.to_dict() if available, else vars()).

8.52.3.14 update()

```
db.station_db.StationDB.update (
    self,
    str mac,
    dict info)
```

Update an existing station's info_dict or attributes.

8.52.4 Member Data Documentation

8.52.4.1 _initialized

```
bool db.station_db.StationDB._initialized = True [protected]
```

8.52.4.2 _instance

```
db.station_db.StationDB._instance = None [static], [protected]
```

8.52.4.3 _lock

```
db.station_db.StationDB._lock = RLock() [static], [protected]
```

8.52.4.4 _stations

```
db.station_db.StationDB._stations = {} [protected]
```

The documentation for this class was generated from the following file:

- db/station_db.py

8.53 station_parser.StationParser Class Reference

Static Public Member Functions

- "Station" [from_content](#) (str content)

Protected Member Functions

- None [_parse_content](#) ([Station](#) station, str content)
- int|None [_get_int](#) (station, str key)
- str|None [_get_str](#) (station, str key)
- None [_populate_attributes](#) ([Station](#) station)

Static Protected Member Functions

- `list[float] _decode_supported_rates (str rate_hex_str)`
- `list[str] _decode_capability (str|None capability)`
- `list[str] _decode_ext_capab (str|None ext_capab)`
- `list[dict[str, str]] _decode_supported_op_classes (str|None supp_op_classes)`
- Any `_convert_value (str value)`
- bool `_is_mac_address (str value)`

8.53.1 Member Function Documentation

8.53.1.1 `_convert_value()`

```
Any station_parser.StationParser._convert_value (
    str value) [static], [protected]
```

Convert textual values to Python types.

8.53.1.2 `_decode_capability()`

```
list[str] station_parser.StationParser._decode_capability (
    str | None capability) [static], [protected]
```

Return list of supported capability flags.

8.53.1.3 `_decode_ext_capab()`

```
list[str] station_parser.StationParser._decode_ext_capab (
    str | None ext_capab) [static], [protected]
```

Decode the variable-length ext_capab hex string into feature names.

8.53.1.4 `_decode_supported_op_classes()`

```
list[dict[str, str]] station_parser.StationParser._decode_supported_op_classes (
    str | None supp_op_classes) [static], [protected]
```

Decode the 'supp_op_classes' hex string into a list of supported operating classes.
Example input: '51515354737475767778797a7b7c7d7e7f808182'

8.53.1.5 `_decode_supported_rates()`

```
list[float] station_parser.StationParser._decode_supported_rates (
    str rate_hex_str) [static], [protected]
```

Convert supported rate codes into Mbps values.

8.53.1.6 `_get_int()`

```
int | None station_parser.StationParser._get_int (
    station,
    str key) [protected]
```

8.53.1.7 `_get_str()`

```
str | None station_parser.StationParser._get_str (
    station,
    str key) [protected]
```

8.53.1.8 `_is_mac_address()`

```
bool station_parser.StationParser._is_mac_address (
    str value) [static], [protected]
```

8.53.1.9 `_parse_content()`

```
None station_parser.StationParser._parse_content (
    Station station,
    str content) [protected]
```

Parse hostapd STA info content into attributes.

8.53.1.10 `_populate_attributes()`

```
None station_parser.StationParser._populate_attributes (
    Station station) [protected]
```

Fill instance vars from parsed dictionary automatically.

8.53.1.11 `from_content()`

```
"Station" station_parser.StationParser.from_content (
    str content) [static]
```

The documentation for this class was generated from the following file:

- [parser/station_parser.py](#)

8.54 metrics.tm_engine.TransitionManagementEngine Class Reference

Public Member Functions

- `__init__` (self, [Controller ctrl](#))
- `run` (self)

Static Public Member Functions

- bool `qoe_quality_test` (float `qoe`)

Public Attributes

- `stdb = StationDB()`
- `nbdb = NeighborDB()`
- `btdb = BSSTransitionResponseDB()`
- `qoedb = QoEDB()`
- `rndb = NeighborRankingDB()`
- `ctrl = ctrl`

Protected Member Functions

- `_run_sta` (self, [Station station](#))

8.54.1 Constructor & Destructor Documentation

8.54.1.1 `__init__()`

```
metrics.tm_engine.TransitionManagementEngine.__init__ (
    self,
    Controller ctrl)
```

8.54.2 Member Function Documentation

8.54.2.1 `_run_sta()`

```
metrics.tm_engine.TransitionManagementEngine._run_stा (
    self,
    Station station) [protected]
```

8.54.2.2 qoe_quality_test()

```
bool metrics.tm_engine.TransitionManagementEngine.qoe_quality_test (
    float qoe)  [static]
```

8.54.2.3 run()

```
metrics.tm_engine.TransitionManagementEngine.run (
    self)
```

8.54.3 Member Data Documentation

8.54.3.1 btdb

```
metrics.tm_engine.TransitionManagementEngine.btdb = BSSTransitionResponseDB\(\)
```

8.54.3.2 ctrl

```
metrics.tm_engine.TransitionManagementEngine.ctrl = ctrl
```

8.54.3.3 nbdb

```
metrics.tm_engine.TransitionManagementEngine.nbdb = NeighborDB\(\)
```

8.54.3.4 qoedb

```
metrics.tm_engine.TransitionManagementEngine.qoedb = QoEDB\(\)
```

8.54.3.5 rndb

```
metrics.tm_engine.TransitionManagementEngine.rndb = NeighborRankingDB\(\)
```

8.54.3.6 stdb

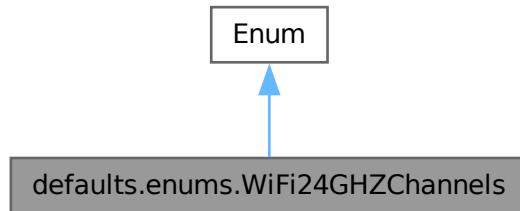
```
metrics.tm_engine.TransitionManagementEngine.std़ = StationDB\(\)
```

The documentation for this class was generated from the following file:

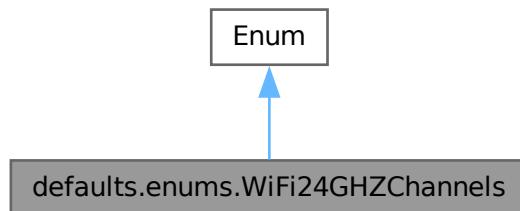
- [metrics/tm_engine.py](#)

8.55 defaults.enums.WiFi24GHZChannels Class Reference

Inheritance diagram for defaults.enums.WiFi24GHZChannels:



Collaboration diagram for defaults.enums.WiFi24GHZChannels:



Static Public Attributes

- int `CHANNEL_1` = 2412
- int `CHANNEL_6` = 2437
- int `CHANNEL_11` = 2462

8.55.1 Member Data Documentation

8.55.1.1 CHANNEL_1

```
int defaults.enums.WiFi24GHZChannels.CHANNEL_1 = 2412 [static]
```

8.55.1.2 CHANNEL_11

```
int defaults.enums.WiFi24GHZChannels.CHANNEL_11 = 2462 [static]
```

8.55.1.3 CHANNEL_6

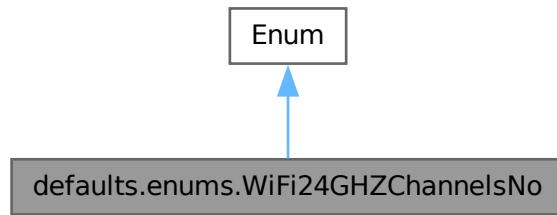
```
int defaults.enums.WiFi24GHZChannels.CHANNEL_6 = 2437 [static]
```

The documentation for this class was generated from the following file:

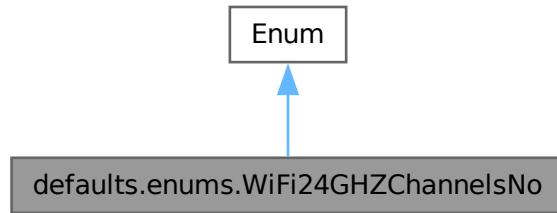
- [defaults/enums.py](#)

8.56 defaults.enums.WiFi24GHZChannelsNo Class Reference

Inheritance diagram for defaults.enums.WiFi24GHZChannelsNo:



Collaboration diagram for defaults.enums.WiFi24GHZChannelsNo:



Static Public Attributes

- int [CHANNEL_1](#) = 1
- int [CHANNEL_6](#) = 6
- int [CHANNEL_11](#) = 11

8.56.1 Member Data Documentation

8.56.1.1 CHANNEL_1

```
int defaults.enums.WiFi24GHZChannelsNo.CHANNEL_1 = 1 [static]
```

8.56.1.2 CHANNEL_11

```
int defaults.enums.WiFi24GHZChannelsNo.CHANNEL_11 = 11 [static]
```

8.56.1.3 CHANNEL_6

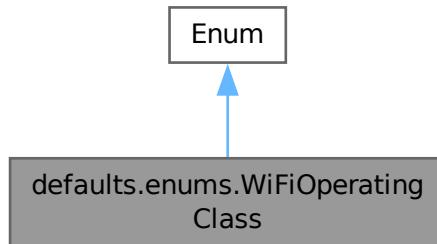
```
int defaults.enums.WiFi24GHZChannelsNo.CHANNEL_6 = 6 [static]
```

The documentation for this class was generated from the following file:

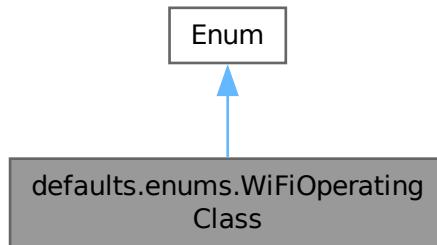
- [defaults/enums.py](#)

8.57 defaults.enums.WiFiOperatingClass Class Reference

Inheritance diagram for defaults.enums.WiFiOperatingClass:



Collaboration diagram for defaults.enums.WiFiOperatingClass:



Static Public Attributes

- int `BAND_2_4GHz_20MHz` = 81
- int `BAND_2_4GHz_40MHz` = 82
- int `BAND_2_4GHz_20MHz_CH14` = 83
- int `BAND_5GHz_20MHz_LOW` = 115
- int `BAND_5GHz_40MHz_LOW` = 116
- int `BAND_5GHz_80MHz_LOW` = 117
- int `BAND_5GHz_160MHz_LOW` = 118
- int `BAND_5GHz_20MHz_HIGH` = 119
- int `BAND_5GHz_40MHz_HIGH` = 120
- int `BAND_5GHz_80MHz_HIGH` = 121
- int `BAND_5GHz_160MHz_HIGH` = 122
- int `BAND_6GHz_20MHz` = 125
- int `BAND_6GHz_40MHz` = 126
- int `BAND_6GHz_80MHz` = 127
- int `BAND_6GHz_160MHz` = 128
- int `BAND_6GHz_20MHz_LOW_BAND` = 129
- int `BAND_6GHz_40MHz_LOW_BAND` = 130
- int `BAND_6GHz_80MHz_LOW_BAND` = 131
- int `BAND_6GHz_160MHz_LOW_BAND` = 132
- int `BAND_60GHz_CHANNEL_1` = 180
- int `BAND_60GHz_CHANNEL_2` = 181
- int `BAND_60GHz_CHANNEL_3` = 182
- int `BAND_60GHz_CHANNEL_4` = 183

8.57.1 Member Data Documentation

8.57.1.1 `BAND_2_4GHz_20MHz`

```
int defaults.enums.WiFiOperatingClass.BAND_2_4GHz_20MHz = 81 [static]
```

8.57.1.2 `BAND_2_4GHz_20MHz_CH14`

```
int defaults.enums.WiFiOperatingClass.BAND_2_4GHz_20MHz_CH14 = 83 [static]
```

8.57.1.3 `BAND_2_4GHz_40MHz`

```
int defaults.enums.WiFiOperatingClass.BAND_2_4GHz_40MHz = 82 [static]
```

8.57.1.4 `BAND_5GHz_160MHz_HIGH`

```
int defaults.enums.WiFiOperatingClass.BAND_5GHz_160MHz_HIGH = 122 [static]
```

8.57.1.5 `BAND_5GHz_160MHz_LOW`

```
int defaults.enums.WiFiOperatingClass.BAND_5GHz_160MHz_LOW = 118 [static]
```

8.57.1.6 BAND_5GHz_20MHz_HIGH

```
int defaults.enums.WiFiOperatingClass.BAND_5GHz_20MHz_HIGH = 119 [static]
```

8.57.1.7 BAND_5GHz_20MHz_LOW

```
int defaults.enums.WiFiOperatingClass.BAND_5GHz_20MHz_LOW = 115 [static]
```

8.57.1.8 BAND_5GHz_40MHz_HIGH

```
int defaults.enums.WiFiOperatingClass.BAND_5GHz_40MHz_HIGH = 120 [static]
```

8.57.1.9 BAND_5GHz_40MHz_LOW

```
int defaults.enums.WiFiOperatingClass.BAND_5GHz_40MHz_LOW = 116 [static]
```

8.57.1.10 BAND_5GHz_80MHz_HIGH

```
int defaults.enums.WiFiOperatingClass.BAND_5GHz_80MHz_HIGH = 121 [static]
```

8.57.1.11 BAND_5GHz_80MHz_LOW

```
int defaults.enums.WiFiOperatingClass.BAND_5GHz_80MHz_LOW = 117 [static]
```

8.57.1.12 BAND_60GHz_CHANNEL_1

```
int defaults.enums.WiFiOperatingClass.BAND_60GHz_CHANNEL_1 = 180 [static]
```

8.57.1.13 BAND_60GHz_CHANNEL_2

```
int defaults.enums.WiFiOperatingClass.BAND_60GHz_CHANNEL_2 = 181 [static]
```

8.57.1.14 BAND_60GHz_CHANNEL_3

```
int defaults.enums.WiFiOperatingClass.BAND_60GHz_CHANNEL_3 = 182 [static]
```

8.57.1.15 BAND_60GHz_CHANNEL_4

```
int defaults.enums.WiFiOperatingClass.BAND_60GHz_CHANNEL_4 = 183 [static]
```

8.57.1.16 BAND_6GHz_160MHz

```
int defaults.enums.WiFiOperatingClass.BAND_6GHz_160MHz = 128 [static]
```

8.57.1.17 BAND_6GHz_160MHz_LOW_BAND

```
int defaults.enums.WiFiOperatingClass.BAND_6GHz_160MHz_LOW_BAND = 132 [static]
```

8.57.1.18 BAND_6GHz_20MHz

```
int defaults.enums.WiFiOperatingClass.BAND_6GHz_20MHz = 125 [static]
```

8.57.1.19 BAND_6GHz_20MHz_LOW_BAND

```
int defaults.enums.WiFiOperatingClass.BAND_6GHz_20MHz_LOW_BAND = 129 [static]
```

8.57.1.20 BAND_6GHz_40MHz

```
int defaults.enums.WiFiOperatingClass.BAND_6GHz_40MHz = 126 [static]
```

8.57.1.21 BAND_6GHz_40MHz_LOW_BAND

```
int defaults.enums.WiFiOperatingClass.BAND_6GHz_40MHz_LOW_BAND = 130 [static]
```

8.57.1.22 BAND_6GHz_80MHz

```
int defaults.enums.WiFiOperatingClass.BAND_6GHz_80MHz = 127 [static]
```

8.57.1.23 BAND_6GHz_80MHz_LOW_BAND

```
int defaults.enums.WiFiOperatingClass.BAND_6GHz_80MHz_LOW_BAND = 131 [static]
```

The documentation for this class was generated from the following file:

- defaults/[enums.py](#)

Chapter 9

File Documentation

9.1 api/stateapi.py File Reference

Classes

- class [api.stateapi.StateAPI](#)

Namespaces

- namespace [api](#)
- namespace [api.stateapi](#)

9.2 command/basics.py File Reference

Classes

- class [basics.BasicCommand](#)

Namespaces

- namespace [basics](#)

9.3 command/bss_tm_cmd.py File Reference

Classes

- class [bss_tm_cmd.ReqMode](#)
- class [bss_tm_cmd.BssTmRequestBuilder](#)

Namespaces

- namespace [bss_tm_cmd](#)

9.4 command/link_measurement_cmd.py File Reference

Classes

- class [link_measurement_cmd.LinkMeasurementCommandBuilder](#)

Namespaces

- namespace [link_measurement_cmd](#)

9.5 command/neighbor_cmd.py File Reference

Classes

- class [neighbor_cmd.NeighborCommandBuilder](#)

Namespaces

- namespace [neighbor_cmd](#)

9.6 command/request_beacon_cmd.py File Reference

Classes

- class [request_beacon_cmd.OperatingClass](#)
- class [request_beacon_cmd.MeasurementMode](#)
- class [request_beacon_cmd.ReqMode](#)
- class [request_beacon_cmd.RequestBeaconCommandBuilder](#)

Namespaces

- namespace [request_beacon_cmd](#)

9.7 control/controller.py File Reference

Classes

- class [control.controller.Controller](#)

Namespaces

- namespace [control](#)
- namespace [control.controller](#)

Variables

- float `control.controller.CONTROLLER_WAIT_LOOP_SEC` = 0.5

9.8 control/hostapd.py File Reference

Classes

- class `control.hostapd.LastCommandStatus`
- class `control.hostapd.HostapdController`

Namespaces

- namespace `control`
- namespace `control.hostapd`

Variables

- `control.hostapd.controller` = `HostapdController()`

9.9 dashboard/bmrep_dashboard.py File Reference

Classes

- class `dashboard.bmrep_dashboard.BeaconMeasurementDashboard`

Namespaces

- namespace `dashboard`
- namespace `dashboard.bmrep_dashboard`

Functions

- `dashboard.bmrep_dashboard.write_stream` (`pipe_or_sock`, `str text`)

9.10 dashboard-bsstm_dashboard.py File Reference

Classes

- class `dashboard.bsstm_dashboard.BSSTransitionResponseDashboard`

Namespaces

- namespace `dashboard`
- namespace `dashboard.bsstm_dashboard`

Functions

- [dashboard.bsstm_dashboard.write_stream](#) (pipe_or_sock, str text)

9.11 dashboard/lmrep_dashboard.py File Reference

Classes

- class [dashboard.lmrep_dashboard.LinkMeasurementDashboard](#)

Namespaces

- namespace [dashboard](#)
- namespace [dashboard.lmrep_dashboard](#)

Functions

- [dashboard.lmrep_dashboard.write_stream](#) (pipe_or_sock, str text)

9.12 dashboard/nbrank_dashboard.py File Reference

Classes

- class [dashboard.nbrank_dashboard.NeighborRankingDashboard](#)

Namespaces

- namespace [dashboard](#)
- namespace [dashboard.nbrank_dashboard](#)

Functions

- [dashboard.nbrank_dashboard.write_stream](#) (pipe_or_sock, str text)
- [dashboard.nbrank_dashboard.rcpi_to_db](#) (rcpi_val)
- [dashboard.nbrank_dashboard.rsni_to_db](#) (rsni_val)

9.13 dashboard/neighbor_dashboard.py File Reference

Classes

- class [dashboard.neighbor_dashboard.NeighborDashboard](#)

Namespaces

- namespace [dashboard](#)
- namespace [dashboard.neighbor_dashboard](#)

Functions

- [dashboard.neighbor_dashboard.write_stream](#) (pipe_or_sock, str text)

9.14 dashboard/pipe_pool.py File Reference

Classes

- class [dashboard.pipe_pool.PipePool](#)

Namespaces

- namespace [dashboard](#)
- namespace [dashboard.pipe_pool](#)

9.15 dashboard/qoe_dashboard.py File Reference

Classes

- class [dashboard.qoe_dashboard.QoEDashboard](#)

Namespaces

- namespace [dashboard](#)
- namespace [dashboard.qoe_dashboard](#)

Functions

- [dashboard.qoe_dashboard.write_stream](#) (pipe_or_sock, str text)

9.16 dashboard/socket_pool.py File Reference

Classes

- class [dashboard.socket_pool.ClientConnection](#)
- class [dashboard.socket_pool.SocketPool](#)

Namespaces

- namespace [dashboard](#)
- namespace [dashboard.socket_pool](#)

9.17 dashboard/station_dashboard.py File Reference

Classes

- class [dashboard.station_dashboard.StationDashboard](#)

Namespaces

- namespace [dashboard](#)
- namespace [dashboard.station_dashboard](#)

Functions

- [dashboard.station_dashboard.write_stream](#) (out, str text)
- str [dashboard.station_dashboard.read_stream](#) (inp)

9.18 db/bmrep_db.py File Reference

Classes

- class [db.bmrep_db.BeaconMeasurementDB](#)

Namespaces

- namespace [db](#)
- namespace [db.bmrep_db](#)

Variables

- str [db.bmrep_db.DEFAULT_STA_MAC](#) = "00:00:00:00:00:00"
- int [db.bmrep_db.EXPIRE_SEC](#) = 300

9.19 db/bsstm_db.py File Reference

Classes

- class [db.bsstm_db.BSSTransitionResponseDB](#)

Namespaces

- namespace [db](#)
- namespace [db.bsstm_db](#)

Variables

- str [db.bsstm_db.DEFAULT_STA_MAC](#) = "00:00:00:00:00:00"

9.20 db/lmrep_db.py File Reference

Classes

- class [db.lmrep_db.LinkMeasurementDB](#)

Namespaces

- namespace [db](#)
- namespace [db.lmrep_db](#)

Variables

- str [db.lmrep_db.DEFAULT_STA_MAC](#) = "00:00:00:00:00:00"

9.21 db/nbrank_db.py File Reference

Classes

- class [db.nbrank_db.NeighborRankingDB](#)

Namespaces

- namespace [db](#)
- namespace [db.nbrank_db](#)

Variables

- str [db.nbrank_db.DEFAULT_STA_MAC](#) = "00:00:00:00:00:00"

9.22 db/neighbor_db.py File Reference

Classes

- class [db.neighbor_db.NeighborDB](#)

Namespaces

- namespace [db](#)
- namespace [db.neighbor_db](#)

Variables

- str [db.neighbor_db.DEFAULT_STA_MAC](#) = "00:00:00:00:00:00"

9.23 db/qoe_db.py File Reference

Classes

- class [db.qoe_db.QoEDB](#)

Namespaces

- namespace [db](#)
- namespace [db.qoe_db](#)

9.24 db/station_db.py File Reference

Classes

- class [db.station_db.StationDB](#)

Namespaces

- namespace [db](#)
- namespace [db.station_db](#)

9.25 defaults/enums.py File Reference

Classes

- class [defaults.enums.WiFi24GHZChannels](#)
- class [defaults.enums.WiFi24GHZChannelsNo](#)
- class [defaults.enums.WiFiOperatingClass](#)

Namespaces

- namespace [defaults](#)
- namespace [defaults.enums](#)

9.26 defaults/info.py File Reference

Namespaces

- namespace [defaults](#)
- namespace [defaults.info](#)

Variables

- dict [defaults.info.CAPABILITY_FLAGS](#)
- dict [defaults.info.EXT_CAPABILITY_FLAGS](#)
- dict [defaults.info.OPERATING_CLASS_TABLE](#)
- dict [defaults.info.PHY_TYPE_TABLE](#)

9.27 logger.py File Reference

Classes

- class [logger.LogLevel](#)
- class [logger.Logger](#)

Namespaces

- namespace [logger](#)

9.28 metrics/nbranking.py File Reference

Classes

- class [metrics.nbranking.NeighborRanking](#)

Namespaces

- namespace [metrics](#)
- namespace [metrics.nbranking](#)

9.29 metrics/qoe.py File Reference

Classes

- class [metrics.qoe.QoEComponents](#)
- class [metrics.qoe.QoEHistory](#)
- class [metrics.qoe.QoE](#)

Namespaces

- namespace [metrics](#)
- namespace [metrics.qoe](#)

9.30 metrics/tm_engine.py File Reference

Classes

- class [metrics.tm_engine.TransitionManagementEngine](#)

Namespaces

- namespace [metrics](#)
- namespace [metrics.tm_engine](#)

Variables

- float [metrics.tm_engine.QOE_TRANSITION_THRESHOLD](#) = 0.55

9.31 model/ap.py File Reference

Classes

- class [model.ap.APStatus](#)
- class [model.ap.AP](#)

Namespaces

- namespace [model](#)
- namespace [model.ap](#)

9.32 model/mac_address.py File Reference

Classes

- class [model.mac_address.MacAddress](#)

Namespaces

- namespace [model](#)
- namespace [model.mac_address](#)

9.33 model/measurement.py File Reference

Classes

- class [model.measurement.BeaconReport](#)
- class [model.measurement.BeaconMeasurement](#)
- class [model.measurement.LinkMeasurement](#)
- class [model.measurement.BSSTransitionResponse](#)

Namespaces

- namespace [model](#)
- namespace [model.measurement](#)

9.34 model/neighbor.py File Reference

Classes

- class [model.neighbor.Neighbor](#)

Namespaces

- namespace [model](#)
- namespace [model.neighbor](#)

9.35 model/station.py File Reference

Classes

- class [model.station.Station](#)

Namespaces

- namespace [model](#)
- namespace [model.station](#)

9.36 parser/ap_parser.py File Reference

Classes

- class [ap_parser.APParser](#)

Namespaces

- namespace [ap_parser](#)

9.37 parser/measurement_parser.py File Reference

Namespaces

- namespace [measurement_parser](#)

Functions

- Optional[[BeaconMeasurement](#)] [measurement_parser.parse_beacon_measurement](#) (dot11)
- Optional[[LinkMeasurement](#)] [measurement_parser.parse_link_measurement](#) (dot11)
- Optional[[BSSTransitionResponse](#)] [measurement_parser.parse_bss_tm_response](#) (dot11)

9.38 parser/neighbor_parser.py File Reference

Classes

- class [neighbor_parser.NeighborParser](#)

Namespaces

- namespace [neighbor_parser](#)

Functions

- Neighbor [neighbor_parser.neighbor_from_beacon_report](#) ([BeaconReport](#) br)

9.39 parser/station_parser.py File Reference

Classes

- class [station_parser.StationParser](#)

Namespaces

- namespace [station_parser](#)

9.40 protocol/rxmux.py File Reference

Classes

- class [rxmux.MgmtType](#)
- class [rxmux.RxMux](#)

Namespaces

- namespace `rxmlux`

9.41 run_tests.py File Reference

Namespaces

- namespace `run_tests`

Functions

- `run_tests.main ()`

9.42 runner.py File Reference

Namespaces

- namespace `runner`

Functions

- `runner.link_measurement_scheduler (ctrl, StationDB stationDB, LinkMeasurementDB lmrepDB, interval_sec)`
- `runner.beacon_measurement_scheduler (ctrl, StationDB stationDB, neighborDB, BeaconMeasurementDB bmrepDB, interval_sec)`
- `runner.qoe_scheduler (QoE qoe_calc, float interval_sec=5.0)`
- `runner.nranking_scheduler (StationDB stdb, NeighborRankingDB nrdb, BeaconMeasurementDB bmr, NeighborDB ndb, float interval_sec=5.0)`
- `runner.bss_tm_scheduler (Controller controller, float interval_sec=5.0)`
- `runner.accept_thread (SocketPool pool, str name)`
- `runner.server_thread ()`
- `runner.main ()`

9.43 api/__init__.py File Reference

Namespaces

- namespace `api`

9.44 control/__init__.py File Reference

Namespaces

- namespace `control`

9.45 dashboard/__init__.py File Reference

Namespaces

- namespace [dashboard](#)

9.46 db/__init__.py File Reference

Namespaces

- namespace [db](#)

9.47 defaults/__init__.py File Reference

Namespaces

- namespace [defaults](#)

9.48 metrics/__init__.py File Reference

Namespaces

- namespace [metrics](#)

9.49 model/__init__.py File Reference

Namespaces

- namespace [model](#)

9.50 store/__init__.py File Reference

Namespaces

- namespace [store](#)

9.51 tests/__init__.py File Reference

Namespaces

- namespace [tests](#)

9.52 store/acceptance.py File Reference

Classes

- class [store.acceptance.BSSTransitionResponseStatus](#)
- class [store.acceptance.BSSTransitionAcceptance](#)

Namespaces

- namespace [store](#)
- namespace [store.acceptance](#)

9.53 store/routine.py File Reference

Classes

- class [store.routine.Routine](#)

Namespaces

- namespace [store](#)
- namespace [store.routine](#)

9.54 tests/test_add_neib.py File Reference

Namespaces

- namespace [tests](#)
- namespace [tests.test_add_neib](#)

Functions

- [tests.test_add_neib.test_add_neib \(\)](#)

9.55 tests/test_bm.py File Reference

Namespaces

- namespace [tests](#)
- namespace [tests.test_bm](#)

Functions

- [tests.test_bm.test_rbm \(\)](#)

9.56 tests/test_bss_tm.py File Reference

Namespaces

- namespace [tests](#)
- namespace [tests.test_bss_tm](#)

Functions

- [tests.test_bss_tm.test_bss_tm \(\)](#)

9.57 tests/test_lm.py File Reference

Namespaces

- namespace [tests](#)
- namespace [tests.test_lm](#)

Functions

- [tests.test_lm.test_lm \(\)](#)

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 db.neighbor_db.NeighborDB, 100
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