## LMP (Link Manager Protocol)

The LM (Link Manager) is the part of a Bluetooth device responsible for connecting to and disconnecting from other devices, and for the control of the connection. An LMP (Link Manager Protocol) message is a packet, or PDU (Packet Data Unit), sent between the LMs of a master and slave Bluetooth device; these messages are **not** propagated to the device's host, but they may trigger an HCI event to be sent to the device's host.

An LMP message is normally transmitted on the ACL link using a DM1 type packet, with the L_CH (Logical Channel) bits of the payload header set to $11_2$. Alternatively, an LMP message may be sent on a SCO link using a DV type packet. The payload body (i.e. the packet data) contains:

Op-code and transaction ID (1 byte):

Transaction ID (least significant 1 bit):
0 for a transaction initiated by the master
1 for a transaction initiated by the slave

Op-code (most significant 7 bits): see below.

Message parameters: the number of parameters and their length is message specific.

### LMP Op-codes

| Op-code | Bluetooth version | Mandatory or Optional | LMP PDU | Length (bytes) | Packet type | Possible direction | Parameters | Position in payload |
|---|---|---|---|---|---|---|---|---|
| 1 | V1.1 V1.2 EDR | M | LMP_name_req | 2 | DM1/DV | m↔s | name offset | 2 |
| 2 | V1.1 V1.2 EDR | M | LMP_name_res | 17 | DM1 | m↔s | name offset | 2 |
| | | | | | | | name length | 3 |
| | | | | | | | name fragment | 4-17 |
| 3 | V1.1 V1.2 EDR | M | LMP_accepted | 2 | DM1/DV | m↔s | op code | 2 |
| 4 | V1.1 V1.2 EDR | M | LMP_not_accepted | 3 | DM1/DV | m↔s | op code | 2 |
| | | | | | | | error code | 3 |
| 5 | V1.1 V1.2 EDR | M | LMP_clkoffset_req | 1 | DM1/DV | m→s | - | |
| 6 | V1.1 V1.2 EDR | M | LMP_clkoffset_res | 3 | DM1/DV | m←s | clock offset | 2-3 |
| 7 | V1.1 V1.2 EDR | M | LMP_detach | 2 | DM1/DV | m↔s | error code | 2 |
| 8 | V1.1 V1.2 EDR | M | LMP_in_rand | 17 | DM1 | m↔s | random number | 2-17 |
| 9 | V1.1 V1.2 EDR | M | LMP_comb_key | 17 | DM1 | m↔s | random number | 2-17 |
| 10 | V1.1 V1.2 EDR | M | LMP_unit_key | 17 | DM1 | m↔s | key | 2-17 |
| 11 | V1.1 V1.2 EDR | M | LMP_au_rand | 17 | DM1 | m↔s | random number | 2-17 |
| 12 | V1.1 V1.2 EDR | M | LMP_sres | 5 | DM1/DV | m↔s | authentication response | 2-5 |
| 13 | V1.1 V1.2 EDR | O | LMP_temp_rand | 17 | DM1 | m→s | random number | 2-17 |
| 14 | V1.1 V1.2 EDR | O | LMP_temp_key | 17 | DM1 | m→s | key | 2-17 |
| 15 | V1.1 V1.2 EDR | O (M) | LMP_encryption_mode_req | 2 | DM1/DV | m↔s | encryption mode | 2 |
| 16 | V1.1 V1.2 EDR | O (M) | LMP_encryption_key_size_req | 2 | DM1/DV | m↔s | key size | 2 |
| 17 | V1.1 V1.2 EDR | O (M) | LMP_start_encryption_req | 17 | DM1 | m→s | random number | 2-17 |
| 18 | V1.1 V1.2 EDR | O (M) | LMP_stop_encryption_req | 1 | DM1/DV | m→s | - | |
| 19 | V1.1 V1.2 EDR | O (M) | LMP_switch_req | 5 | DM1/DV | m↔s | switch instant | 2-5 |
| 20 | V1.1 V1.2 EDR | O | LMP_hold | 7 | DM1/DV | m↔s | hold time | 2-3 |
| | | | | | | | hold instant | 4-7 |
| 21 | V1.1 V1.2 EDR | O | LMP_hold_req | 7 | DM1/DV | m↔s | hold time | 2-3 |
| | | | | | | | hold instant | 4-7 |
| 23 | V1.1 V1.2 EDR | O | LMP_sniff_req | 10 | DM1 | m↔s | timing control flags | 2 |
| | | | | | | | $D_{sniff}$ | 3-4 |
| | | | | | | | $T_{sniff}$ | 5-6 |
| | | | | | | | sniff attempt | 7-8 |
| | | | | | | | sniff timeout | 9-10 |
| 24 | V1.1 V1.2 EDR | O | LMP_unsniff_req | 1 | DM1/DV | m↔s | - | |
| 25 | V1.1 V1.2 EDR | O | LMP_park_req | 17 | DM1 | m↔s | timing control flags | 2 |
| | | | | | | | $D_B$ | 3-4 |
| | | | | | | | $T_B$ | 5-6 |
| | | | | | | | $N_B$ | 7 |
| | | | | | | | $\Delta_B$ | 8 |
| | | | | | | | PM_ADDR | 9 |
| | | | | | | | AR_ADDR | 10 |
| | | | | | | | $N_{Bsleep}$ | 11 |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | $D_{Bsleep}$ | 12 |
| | | | | | | | | $D_{access}$ | 13 |
| | | | | | | | | $T_{access}$ | 14 |
| | | | | | | | | $N_{acc\text{-}slots}$ | 15 |
| | | | | | | | | $N_{poll}$ | 16 |
| | | | | | | | | $M_{access}$ | 17:0-3 |
| | | | | | | | | access scheme | 17:4-7 |
| 27 | V1.1 | V1.2 | EDR | O | LMP_set_broadcast_scan_window | 4 or 6 | DM1 | m→s | timing control flags | 2 |
| | | | | | | | | | $D_B$ | 3-4 |
| | | | | | | | | | broadcast scan window | 5-6 |
| 28 | V1.1 | V1.2 | EDR | O | LMP_modify_beacon | 11 or 13 | DM1 | m→s | timing control flags | 2 |
| | | | | | | | | | $D_B$ | 3-4 |
| | | | | | | | | | $T_B$ | 5-6 |
| | | | | | | | | | $N_B$ | 7 |
| | | | | | | | | | $\Delta_B$ | 8 |
| | | | | | | | | | $D_{access}$ | 9 |
| | | | | | | | | | $T_{access}$ | 10 |
| | | | | | | | | | $N_{acc\text{-}slots}$ | 11 |
| | | | | | | | | | $N_{poll}$ | 12 |
| | | | | | | | | | $M_{access}$ | 13:0-3 |
| | | | | | | | | | access scheme | 13:4-7 |
| 29 | V1.1 | V1.2 | EDR | O | LMP_unpark_BD_ADDR_req | variable | DM1 | m→s | timing control flags | 2 |
| | | | | | | | | | $D_B$ | 3-4 |
| | | | | | | | | | LT_ADDR 1st unpark | 5:0-2 |
| | | | | | | | | | LT_ADDR 2nd unpark | 5:4-6 |
| | | | | | | | | | BD_ADDR 1st unpark | 6-11 |
| | | | | | | | | | BD_ADDR 2nd unpark | 12-17 |
| 30 | V1.1 | V1.2 | EDR | O | LMP_unpark_PM_ADDR_req | variable | DM1 | m→s | timing control flags | 2 |
| | | | | | | | | | $D_B$ | 3-4 |
| | | | | | | | | | LT_ADDR 1st unpark | 5:0-3 |
| | | | | | | | | | LT_ADDR 2nd unpark | 5:4-7 |
| | | | | | | | | | PM_ADDR 1st unpark | 6 |
| | | | | | | | | | PM_ADDR 2nd unpark | 7 |
| | | | | | | | | | LT_ADDR 3rd unpark | 8:0-3 |
| | | | | | | | | | LT_ADDR 4th unpark | 8:4-7 |
| | | | | | | | | | PM_ADDR 3rd unpark | 9 |
| | | | | | | | | | PM_ADDR 4th unpark | 10 |
| | | | | | | | | | LT_ADDR 5th unpark | 11:0-3 |
| | | | | | | | | | LT_ADDR 6th unpark | 11:4-7 |
| | | | | | | | | | PM_ADDR 6th unpark | 12 |
| | | | | | | | | | PM_ADDR 6th unpark | 13 |
| | | | | | | | | | LT_ADDR 7th unpark | 14:0-3 |
| | | | | | | | | | PM_ADDR 7th unpark | 15 |
| 31 | V1.1 | V1.2 | EDR | O | LMP_incr_power_req | 2 | DM1/DV | m↔s | for future use | 2 |
| 32 | V1.1 | V1.2 | EDR | O | LMP_decr_power_req | 2 | DM1/DV | m↔s | for future use | 2 |
| 33 | V1.1 | V1.2 | EDR | O | LMP_max_power | 1 | DM1/DV | m↔s | - | |
| 34 | V1.1 | V1.2 | EDR | O | LMP_min_power | 1 | DM1/DV | m↔s | - | |
| 35 | V1.1 | V1.2 | EDR | O | LMP_auto_rate | 1 | DM1/DV | m↔s | - | |
| 36 | V1.1 | V1.2 | EDR | O | LMP_preferred_rate | 2 | DM1/DV | m↔s | data rate | 2 |
| 37 | V1.1 | V1.2 | EDR | M | LMP_version_req | 6 | DM1/DV | m↔s | VersNr | 2 |
| | | | | | | | | | CompId | 3-4 |
| | | | | | | | | | SubVersNr | 5-6 |
| 38 | V1.1 | V1.2 | EDR | M | LMP_version_res | 6 | DM1/DV | m↔s | VersNr | 2 |
| | | | | | | | | | CompId | 3-4 |
| | | | | | | | | | SubVersNr | 5-6 |
| 39 | V1.1 | V1.2 | EDR | M | LMP_features_req | 9 | DM1/DV | m↔s | features | 2-9 |
| 40 | V1.1 | V1.2 | EDR | M | LMP_features_res | 9 | DM1/DV | m↔s | features | 2-9 |
| 41 | V1.1 | V1.2 | EDR | M | LMP_quality_of_service | 4 | DM1/DV | m→s | poll interval | 2-3 |
| | | | | | | | | | $N_{BC}$ | 4 |

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|---|---|---|---|---|---|---|---|---|---|
| 42 | V1.1 | V1.2 | EDR | M | LMP_quality_of_service_req | 4 | DM1/DV | m↔s | poll interval | 2-3 |
| | | | | | | | | | $N_{BC}$ | 4 |
| 43 | V1.1 | V1.2 | EDR | O | LMP_SCO_link_req | 7 | DM1/DV | m↔s | SCO handle | 2 |
| | | | | | | | | | timing control flags | 3 |
| | | | | | | | | | $D_{SCO}$ | 4 |
| | | | | | | | | | $T_{SCO}$ | 5 |
| | | | | | | | | | SCO packet | 6 |
| | | | | | | | | | air mode | 7 |
| 44 | V1.1 | V1.2 | EDR | O | LMP_remove_SCO_link_req | 3 | DM1/DV | m↔s | SCO handle | 2 |
| | | | | | | | | | error code | 3 |
| 45 | V1.1 | V1.2 | EDR | M | LMP_max_slot | 2 | DM1/DV | m↔s | max slots | 2 |
| 46 | V1.1 | V1.2 | EDR | M | LMP_max_slot_req | 2 | DM1/DV | m↔s | max slots | 2 |
| 47 | V1.1 | V1.2 | EDR | O | LMP_timing_accuracy_req | 1 | DM1/DV | m↔s | - | |
| 48 | V1.1 | V1.2 | EDR | O (M) | LMP_timing_accuracy_res | 3 | DM1/DV | m↔s | drift | 2 |
| | | | | | | | | | jitter | 3 |
| 49 | V1.1 | V1.2 | EDR | M | LMP_setup_complete | 1 | DM1 | m↔s | - | |
| 50 | V1.1 | V1.2 | EDR | O | LMP_use_semi_permanent_key | 1 | DM1/DV | m→s | - | |
| 51 | V1.1 | V1.2 | EDR | M | LMP_host_connection_req | 1 | DM1/DV | m↔s | - | |
| 52 | V1.1 | V1.2 | EDR | O (M) | LMP_slot_offset | 9 | DM1/DV | m↔s | slot offset | 2-3 |
| | | | | | | | | | BD_ADDR | 4-9 |
| 53 | V1.1 | V1.2 | EDR | O | LMP_page_mode_req | 3 | DM1/DV | m↔s | paging scheme | 2 |
| | | | | | | | | | paging scheme settings | 3 |
| 54 | V1.1 | V1.2 | EDR | O | LMP_page_scan_mode_req | 3 | DM1/DV | m↔s | paging scheme | 2 |
| | | | | | | | | | paging scheme settings | 3 |
| 55 | V1.1 | V1.2 | EDR | M | LMP_supervision_timeout | 3 | DM1/DV | m→s | supervision timeout | 2-3 |
| 56 | V1.1 | V1.2 | EDR | O | LMP_test_activate | 1 | DM1/DV | m→s | - | |
| 57 | V1.1 | V1.2 | EDR | O | LMP_test_control | 10 | DM1 | m→s | test scenario | 2 |
| | | | | | | | | | hopping mode | 3 |
| | | | | | | | | | TX frequency | 4 |
| | | | | | | | | | RX frequency | 5 |
| | | | | | | | | | power control mode | 6 |
| | | | | | | | | | poll period | 7 |
| | | | | | | | | | packet type | 8 |
| | | | | | | | | | length of test data | 9-10 |
| 58 | — | V1.2 | EDR | O | LMP_encryption_key_size_mask_req | 1 | DM1 | m→s | - | |
| 59 | — | V1.2 | EDR | O | LMP_encryption_key_size_mask_res | 3 | DM1 | m←s | key size mask | 2-3 |
| 60 | — | V1.2 | EDR | O (M) | LMP_set_AFH | 16 | DM1 | m→s | AFH_instant | 2-5 |
| | | | | | | | | | AFH_mode | 6 |
| | | | | | | | | | AFH_channel_map | 7-16 |
| 127,1 | — | V1.2 | EDR | O | LMP_accepted_ext | 4 | DM1 | m↔s | escape op code | 3 |
| | | | | | | | | | extended op code | 4 |
| 127,2 | — | V1.2 | EDR | O | LMP_not_accepted_ext | 5 | DM1 | m↔s | escape op code | 3 |
| | | | | | | | | | extended op code | 4 |
| | | | | | | | | | error code | 5 |
| 127,3 | — | V1.2 | EDR | O | LMP_features_req_ext | 12 | DM1 | m↔s | features page | 3 |
| | | | | | | | | | max supported page | 4 |
| | | | | | | | | | extended features | 5-12 |
| 127,4 | — | V1.2 | EDR | O | LMP_features_res_ext | 12 | DM1 | m↔s | features page | 3 |
| | | | | | | | | | max supported page | 4 |
| | | | | | | | | | extended features | 5-12 |
| 127,11 | — | — | EDR | O | LMP_packet_type_table_req | 3 | DM1 | m↔s | packet type table | 3 |
| 127,12 | — | V1.2 | EDR | O | LMP_eSCO_link_req | 16 | DM1 | m↔s | eSCO handle | 3 |
| | | | | | | | | | eSCO LT_ADDR | 4 |
| | | | | | | | | | timing control flags | 5 |
| | | | | | | | | | $D_{eSCO}$ | 6 |
| | | | | | | | | | $T_{eSCO}$ | 7 |
| | | | | | | | | | $W_{eSCO}$ | 8 |
| | | | | | | | | | SCO packet type M→S | 9 |
| | | | | | | | | | SCO packet type S→M | 10 |
| | | | | | | | | | packet length M→S | 11-12 |
| | | | | | | | | | packet length S→M | 13-14 |
| | | | | | | | | | air mode | 15 |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | negotiation state | 16 |
| 127,13 | — | V1.2 | EDR | O | LMP_remove_eSCO_link_req | 4 | DM1 | m↔s | eSCO handle | 3 |
| | | | | | | | | | error code | 4 |
| 127,16 | — | V1.2 | EDR | O | LMP_channel_classification_req | 7 | DM1 | m→s | AFH_reporting_mode | 3 |
| | | | | | | | | | AFH_min_interval | 4-5 |
| | | | | | | | | | AFH_max_interval | 6-7 |
| 127,17 | — | V1.2 | EDR | O | LMP_channel_classification | 12 | DM1 | m←s | AFH_channel_classification | 3-12 |