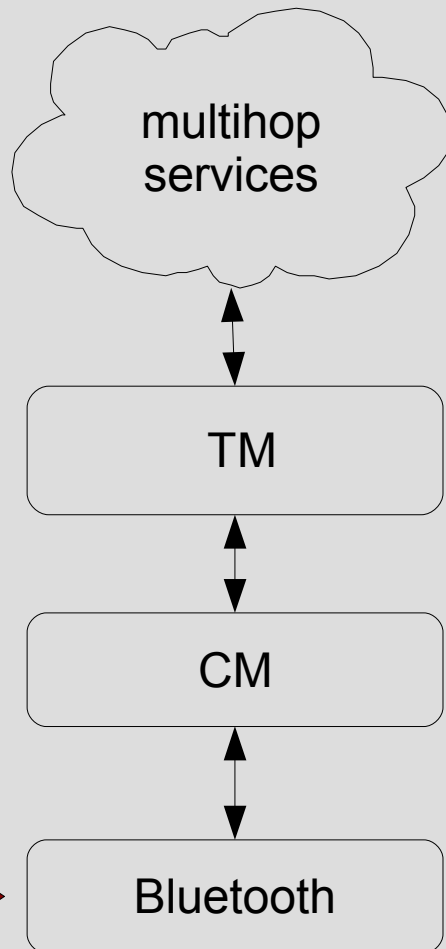


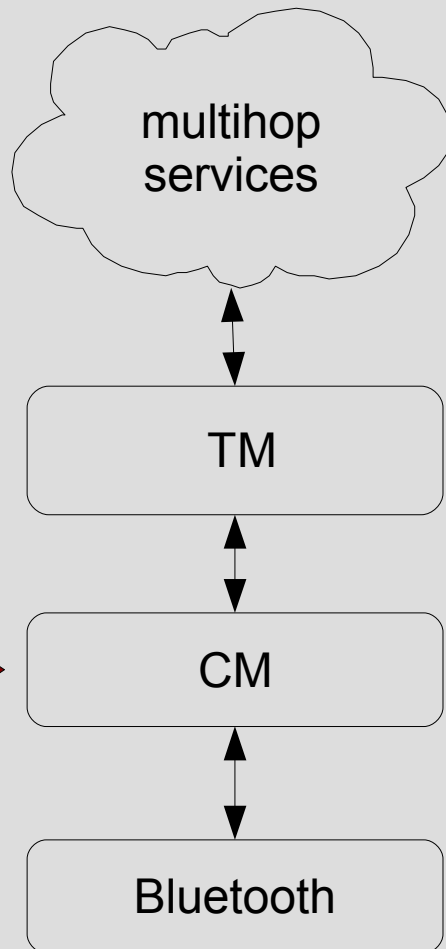
JAWS



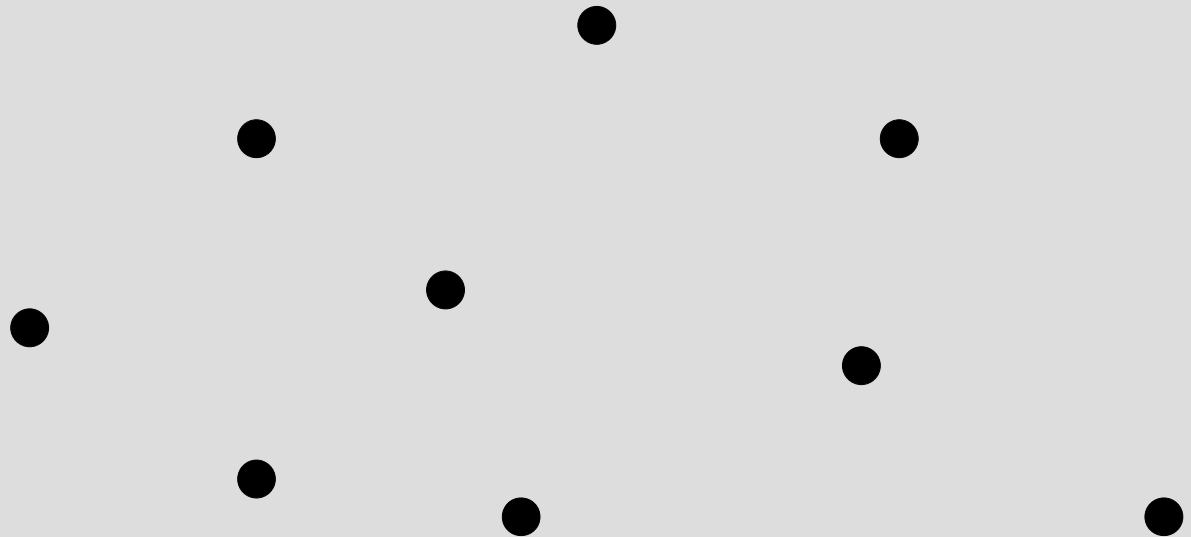
- Bluetooth itself provides no multihop functionality
 - software like JAWS must handle this (connections and packet transports)
- Communication Layer: L2CAP (connectionless)
 - packet-oriented
 - Multiplexing: PSM

```
l2cap_cl_init(bt_stack, psmux);
```

Connection Manager



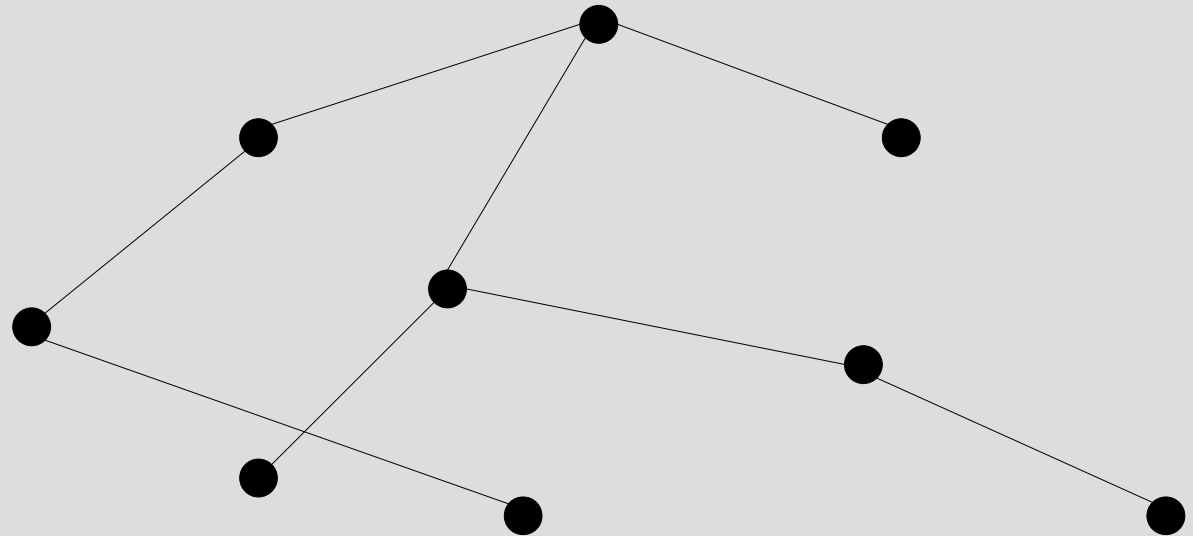
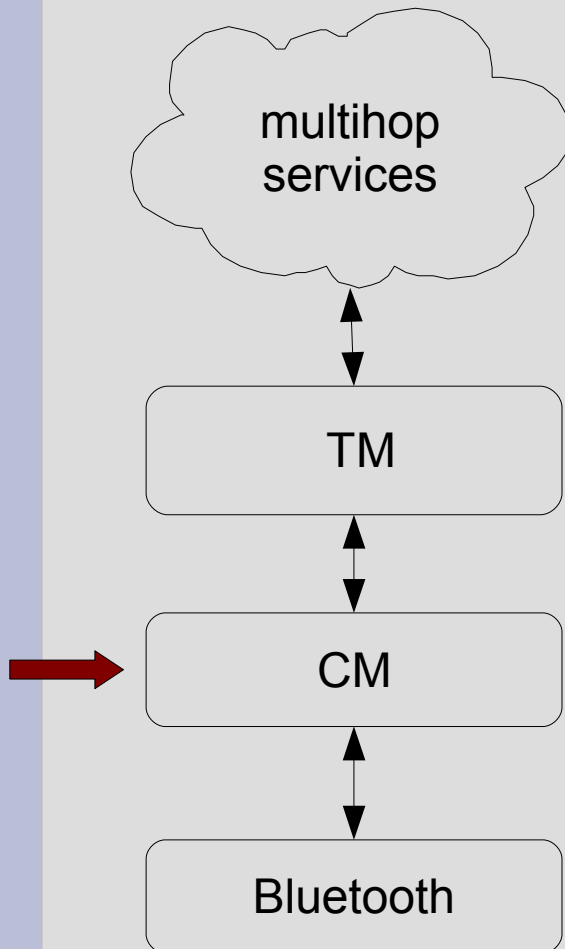
- autonomous construction of a topology



```
cm_init(bt_stack, psmux,  
        CM_PSM, con_table_cb, CM_COD);
```

Connection Manager (TCM)

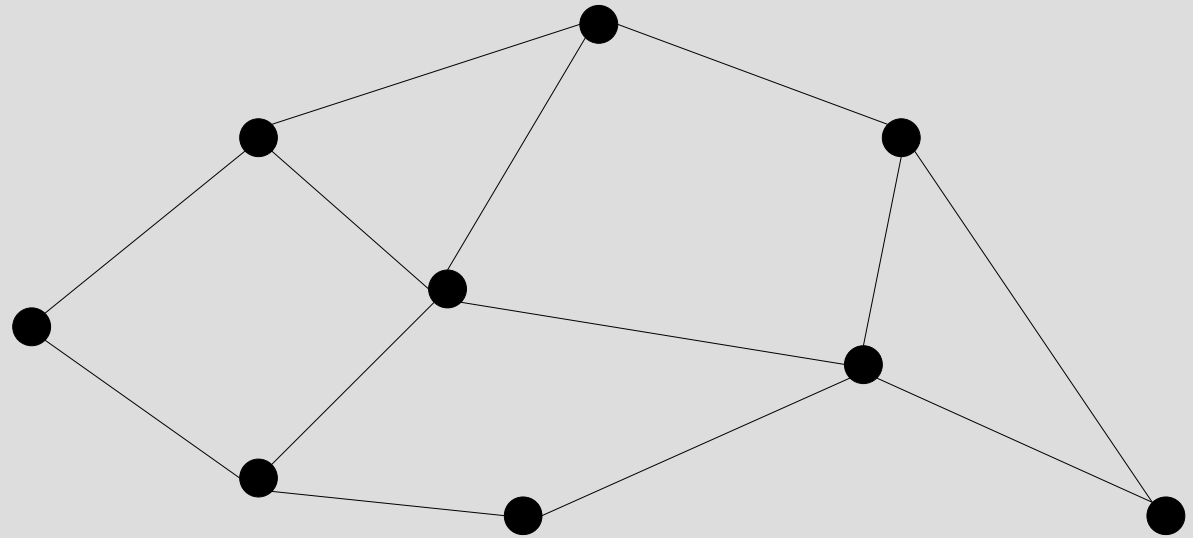
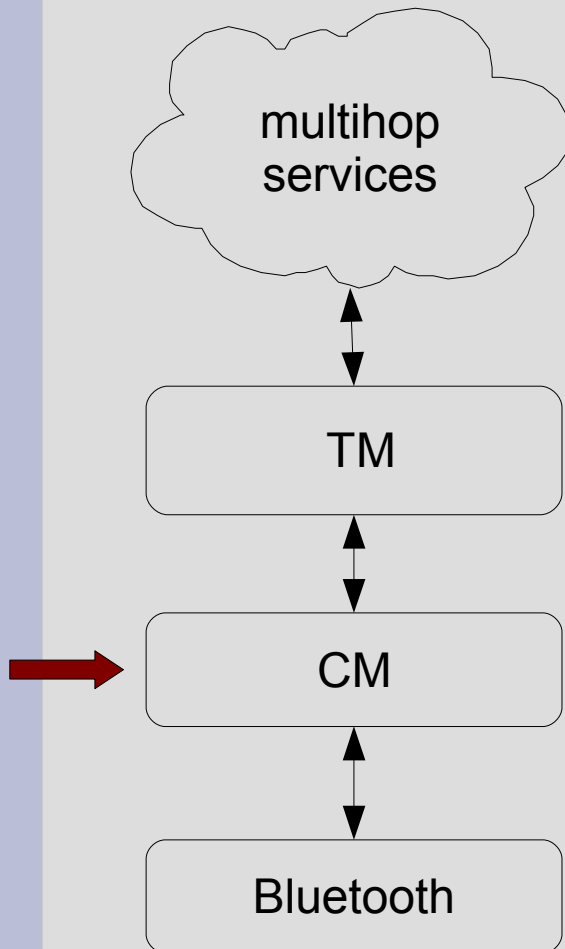
- Tree CM



```
#include <cm/cm_tree.h>
```

Connection Manager (XCM)

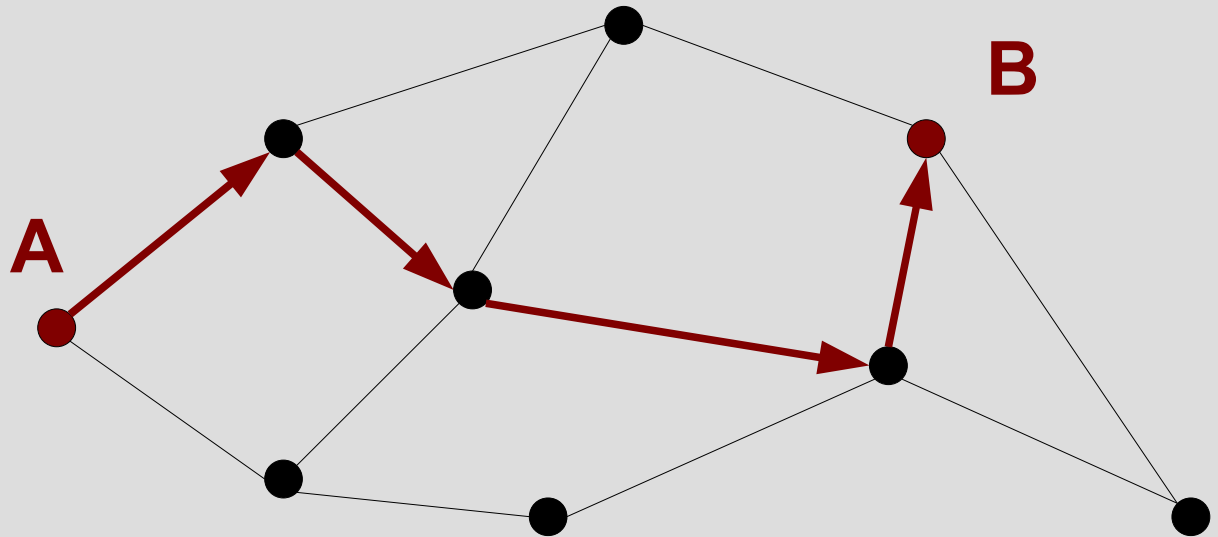
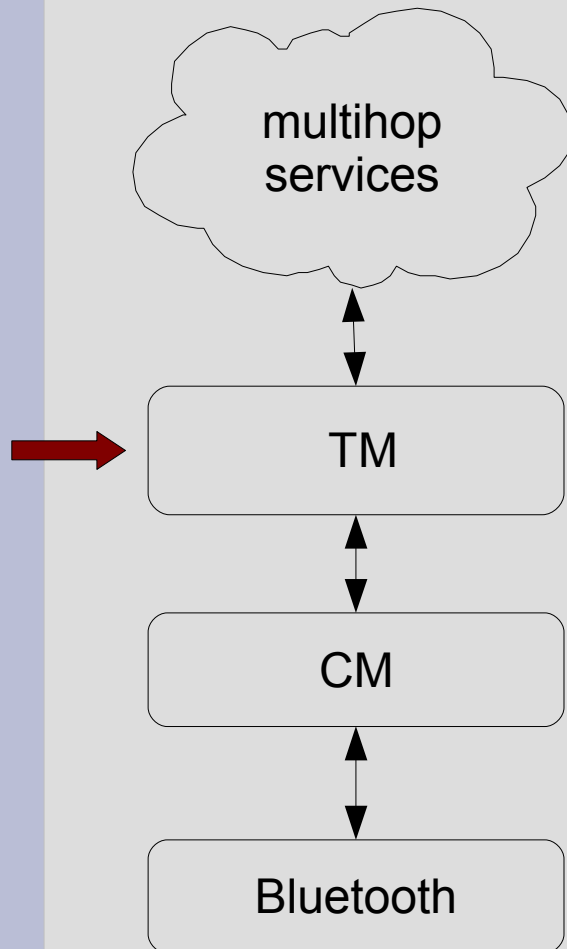
- XTC CM (recommended)



```
#include <cm/cm_xtc.h>
```

Transport Manager

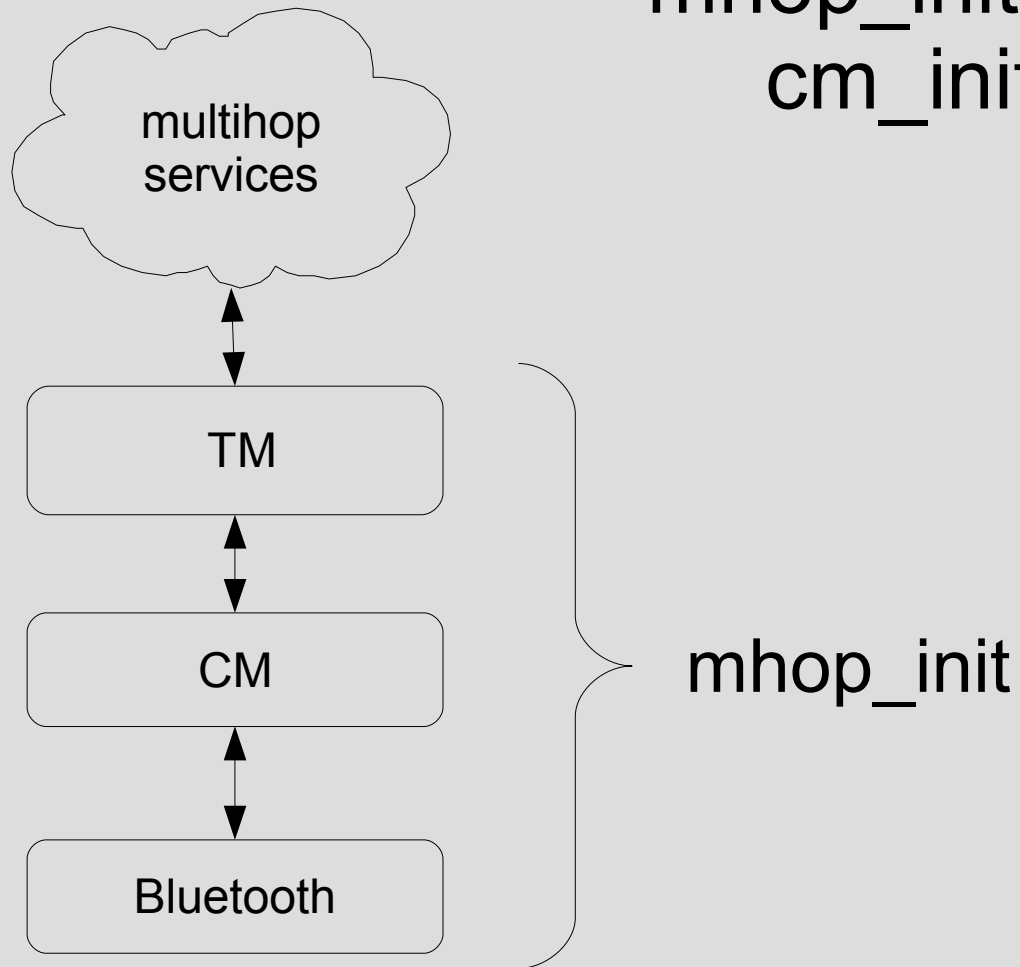
- forwards packets to the destination



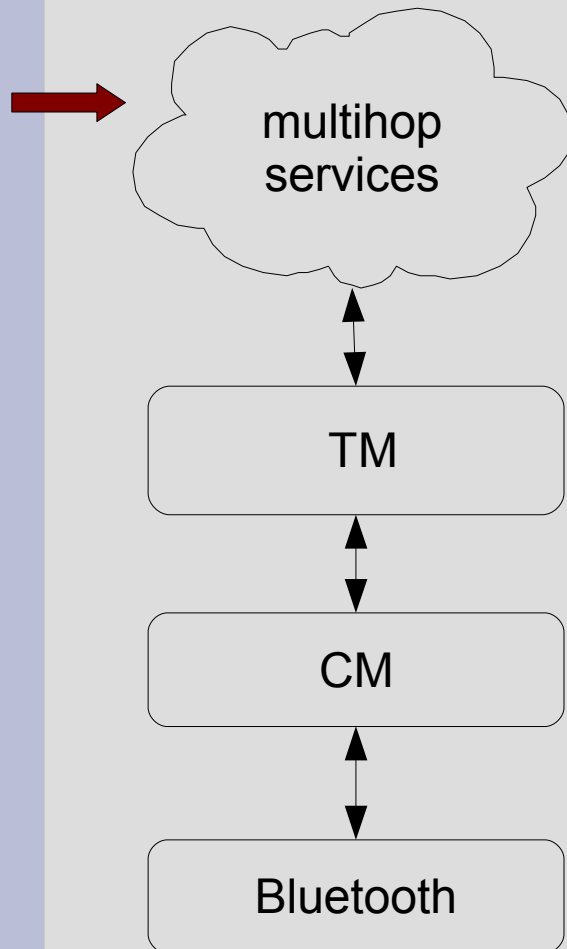
```
mhop_cl_init(bt_stack, psmux,  
             MHOP_PSM, FWD_PSM, fwd_bufs,  
             con_table_cb);
```

Initialisation

- $\text{mhop_init} = \text{l2cap_cl_init} + \text{cm_init} + \text{mhop_cl_init}$



Multihop Services



- **register psm/service**

```
service_nr =  
    bt_psm_service_register(psmux,  
        SERVICE_PSM, data_cb, cb_arg);
```

- **set packet buffer**

```
bt_psm_service_set_buffers(  
    psmux, service_nr, pkt_bufs,  
    msg_bearer);
```

- **send packet (multihop)**

```
mhop_cl_send_pkt(&payload,  
    len, SOURCE_RECORD, VERBOSE,  
    ttl, dest_addr, SERVICE_PSM);
```

Further Readings

- Example code: `btnut/app/mhop-blink`
- CM, TM, TCM:
<ftp://ftp.tik.ee.ethz.ch/pub/people/beutel/BDMT2005.pdf>
- XTC algorithm (from Wattenhofer):
<http://www.dcg.ethz.ch/publications/wman04.pdf>