



ERICSSON

embedded erlang development

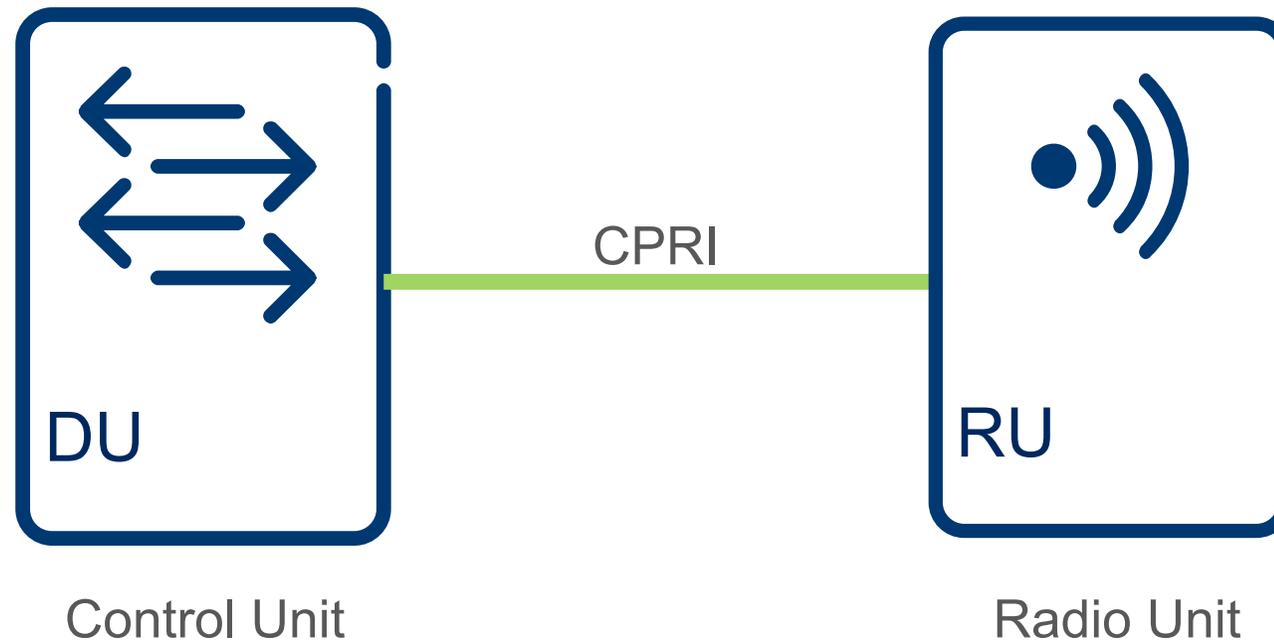
Erlang User Conference Stockholm 2015-06-12
Anders Danne, Graham Crowe



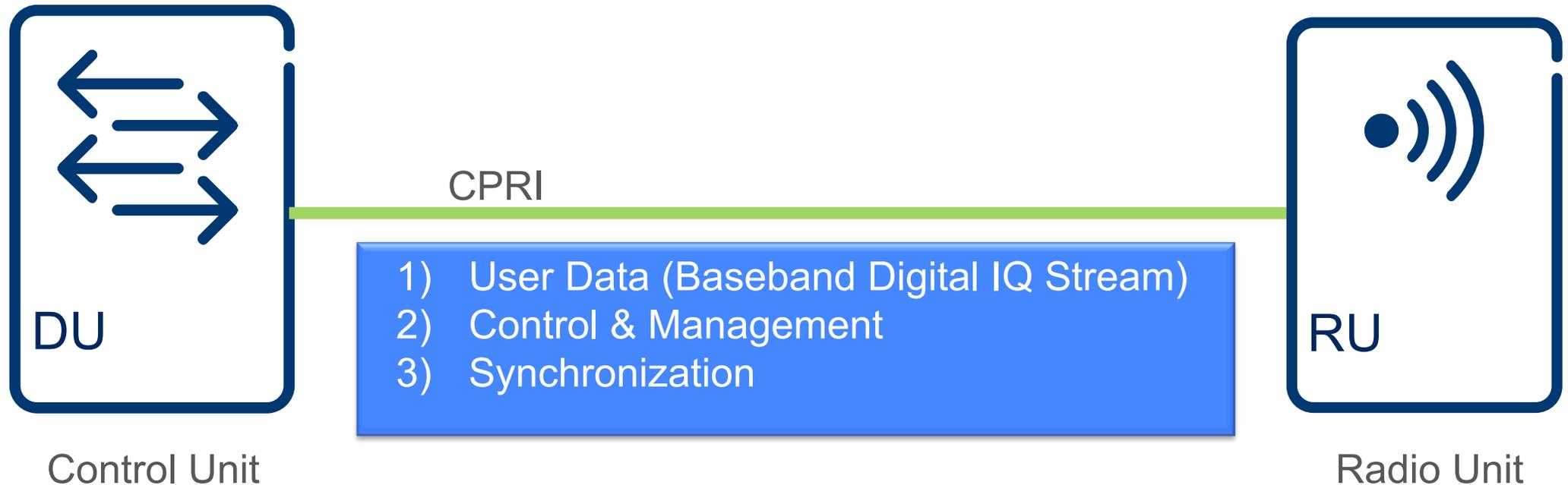




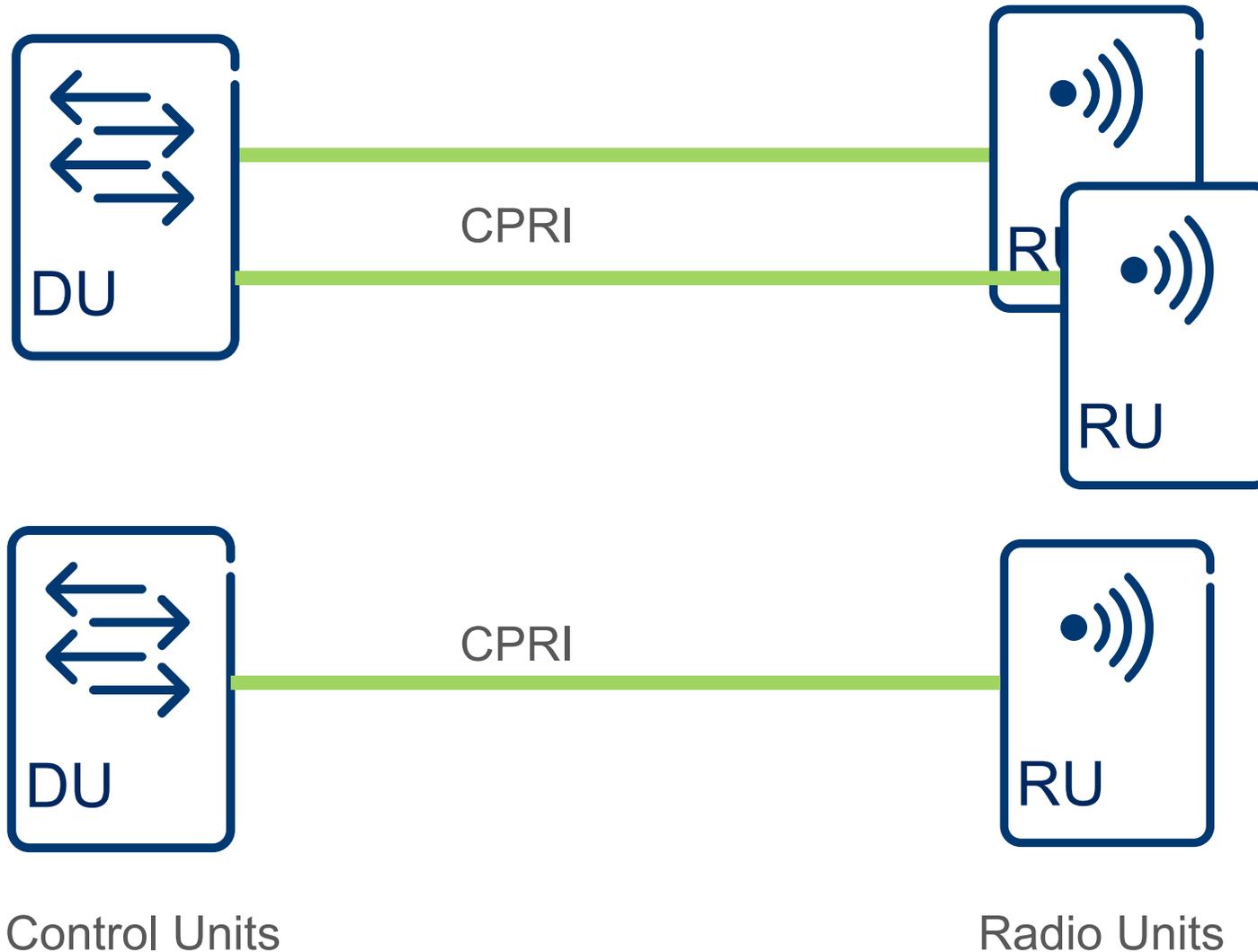
Base station block schema



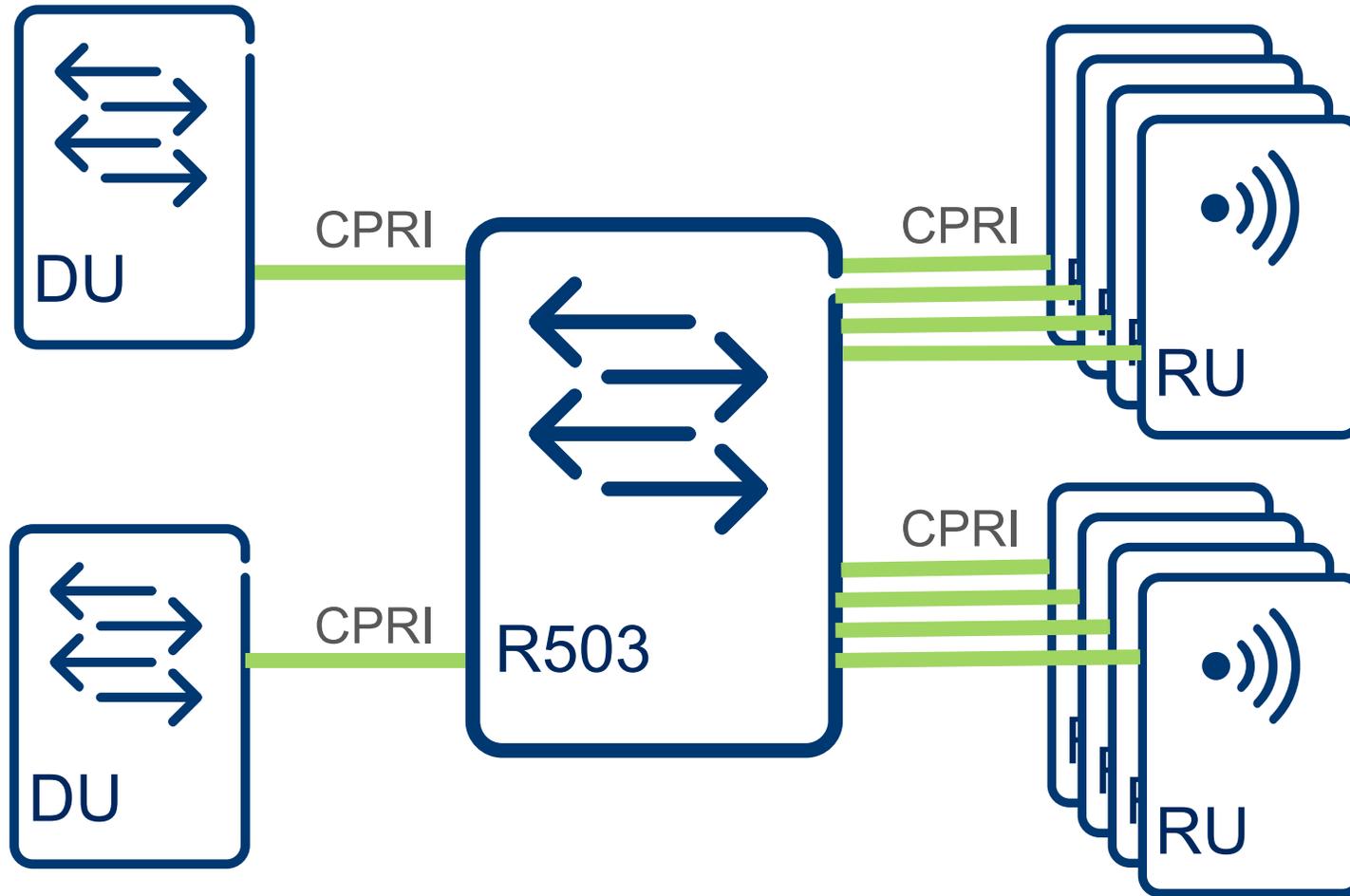
cPRI – Common Public Radio interface



Base station configurations



More Flexible configurations

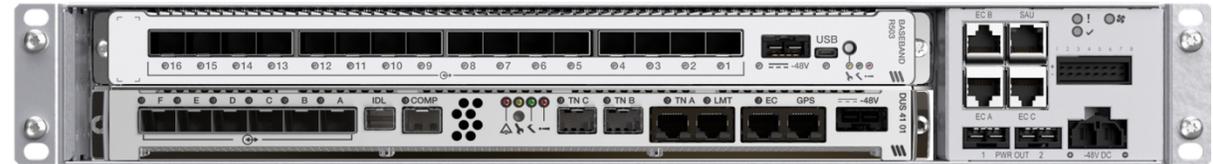
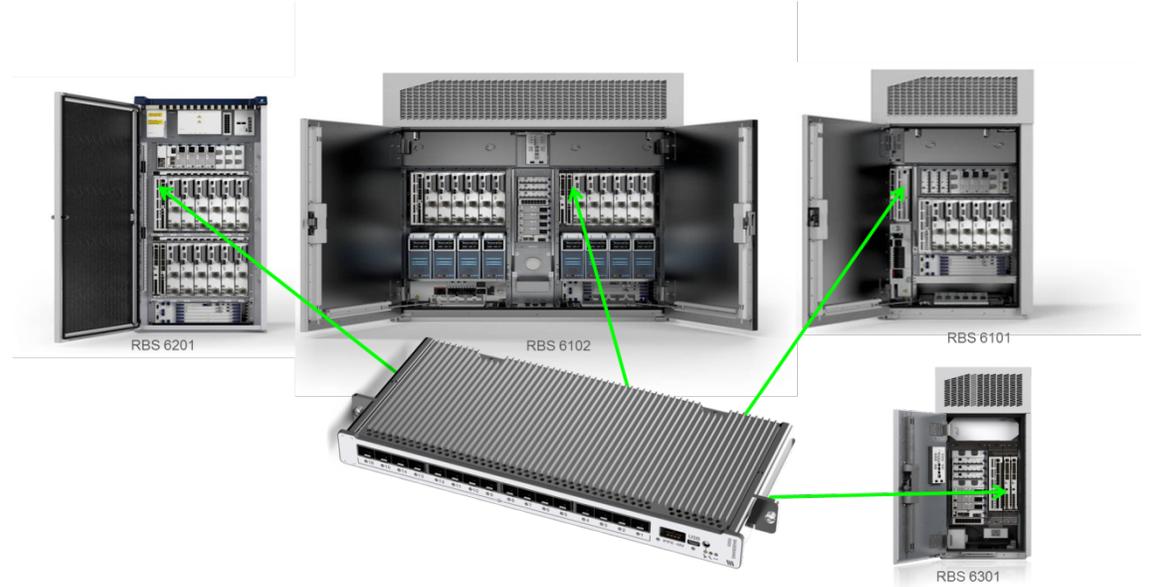


Control Units

Radio Units

Baseband R503

- › Increased connectivity for new & existing radio units in large radio system configurations
- › CPRI multiplexing and de-multiplexing
 - 16x SFP+ ports
 - › Pluggable optical transceivers
 - › Direct attach cables (electrical)



1989

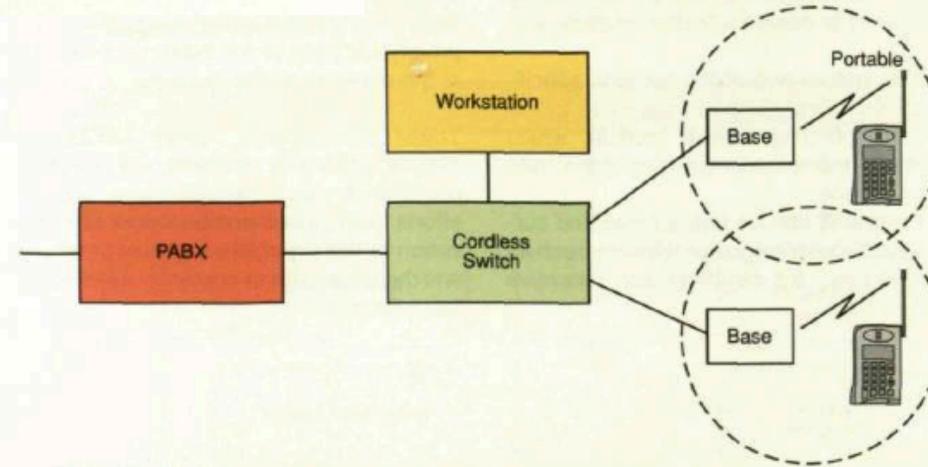


Joe, Robert, Mike



Prototyping Cordless Using Declarative Programming

Erlang talk on ISS92 in Yokohama



used as in mathematics or in other functional languages.

Erlang handles concurrency explicitly through light-weight processes. Process sizes increase and decrease dynamically. This makes it possible to use many processes and describe the application quite regardless of implementation considerations.

Processes communicate by sending and receiving messages in a way similar to SDL. Erlang uses active signal reception where each receive statement specifies which signal it expects to receive.

Erlang uses recursion to describe iteration through the technique of last-call optimisation. This also makes for a pure style

ERICSSON REVIEW No. 2, 1993



ANDERS DANNE
JOHN-OLOF BAUNER
Ericsson Radio Systems AB
INGEMAR AHLBERG
Ellemtel Utvecklings AB



of programming, as exemplified in the following function representing a process which holds a counter in a system:

```
counter(N) ->
receive
  (increment) -> counter(N + 1);
```

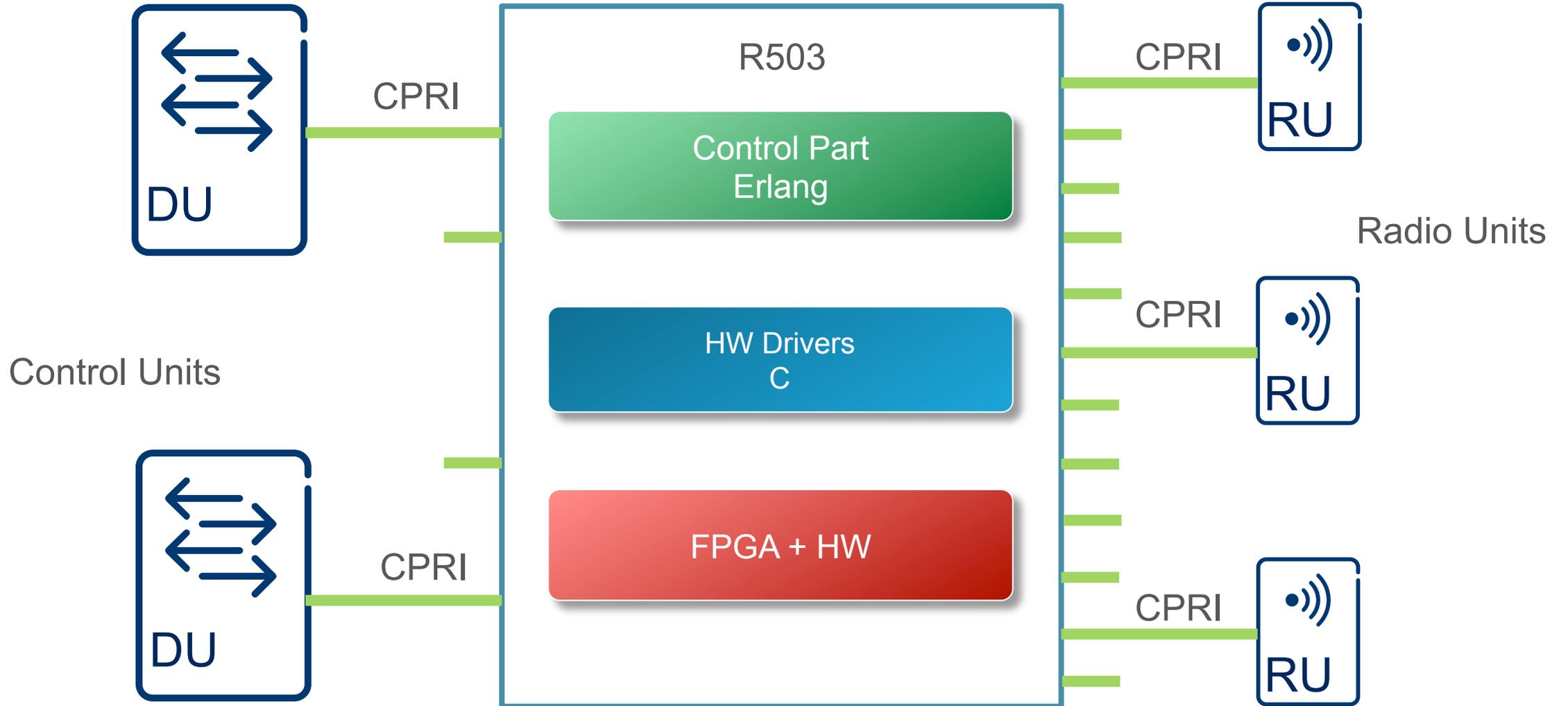


The DCT900 radio exchange

The DCT900⁴ system is similar to a DECT⁵ system based on Multicarrier/Time Division Multiple Access/Time Division Duplex (MC/TDMA/TDD) technique. It is designed for a high density of users



Baseband R503

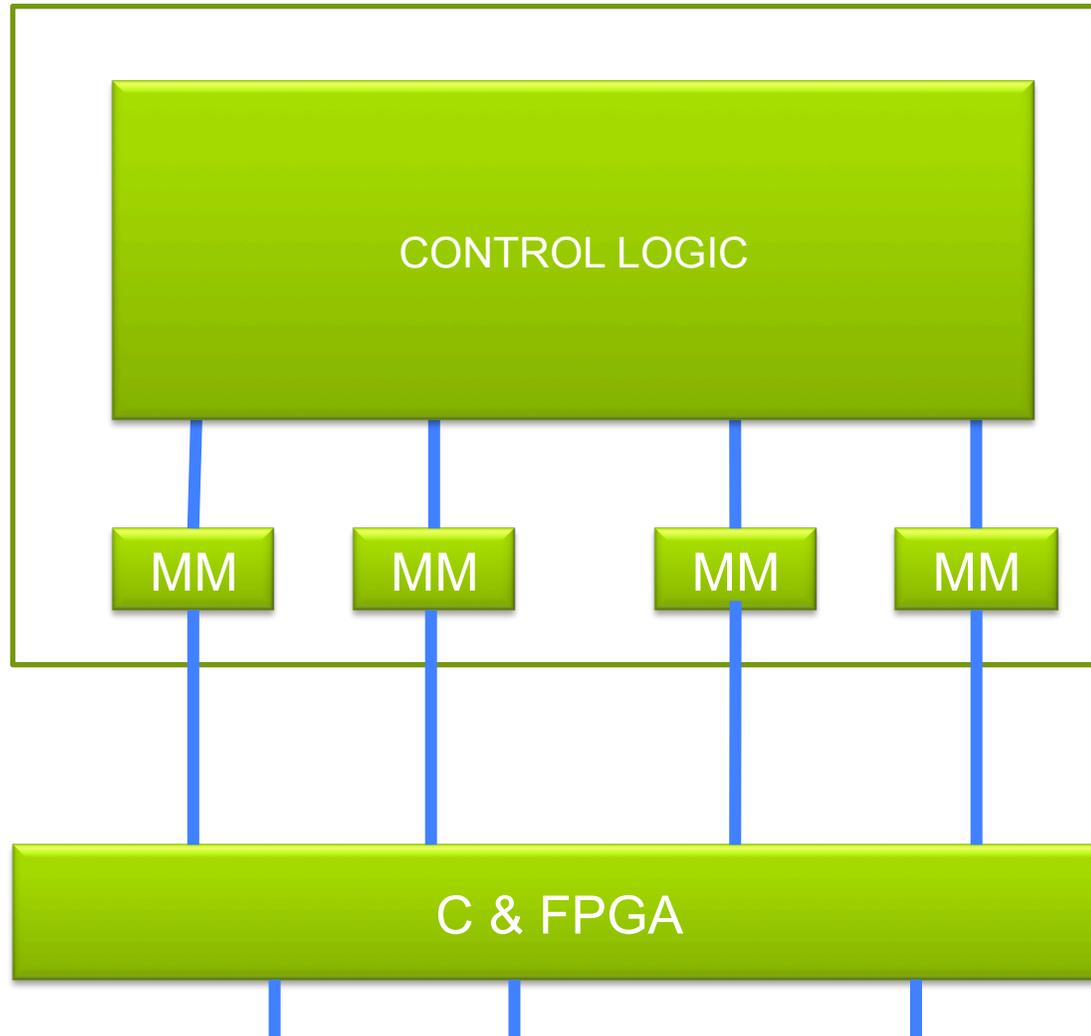


MEMORY FOOTPRINT



- › Complete standard Erlang/OTP installation approx 150 Mbyte
- › Pick some of the OTP modules
- › Strip debug information from OTP
- › Now 6 Mbyte for Erlang
 - Application 1 Mbyte
 - Erlang/OTP 5 Mbyte

Erlang CONTROL logic

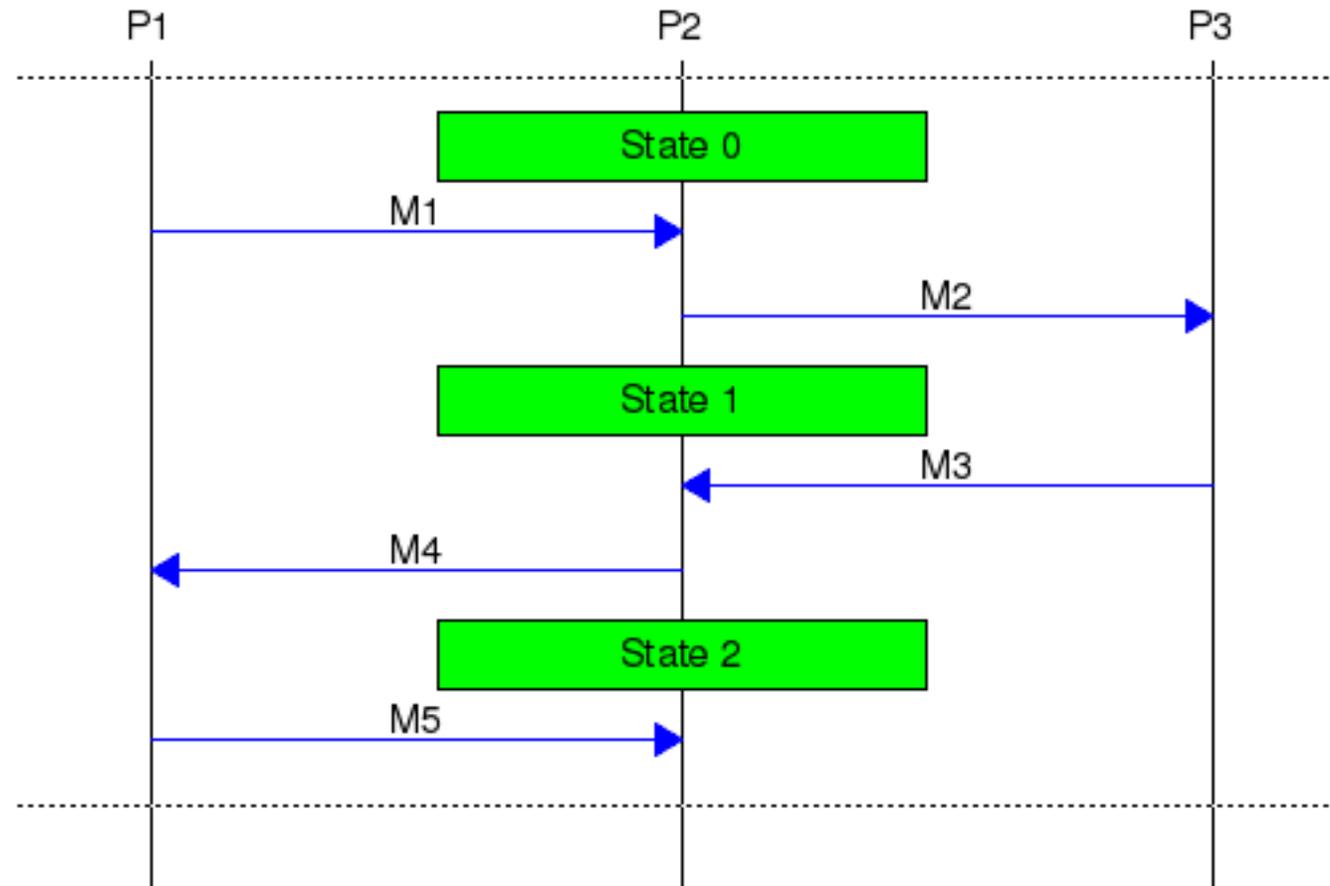


Control logic

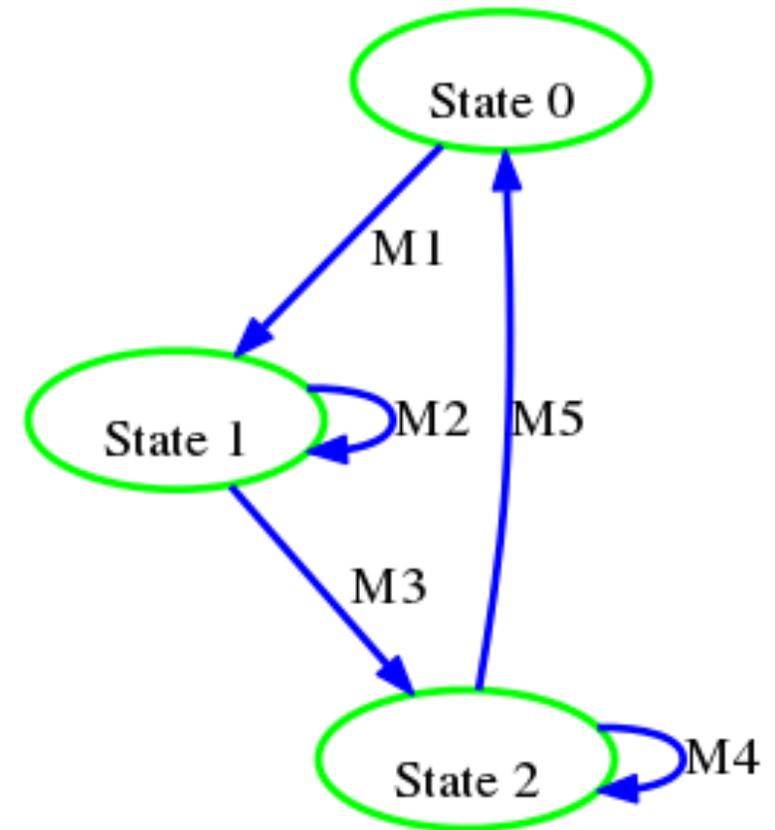
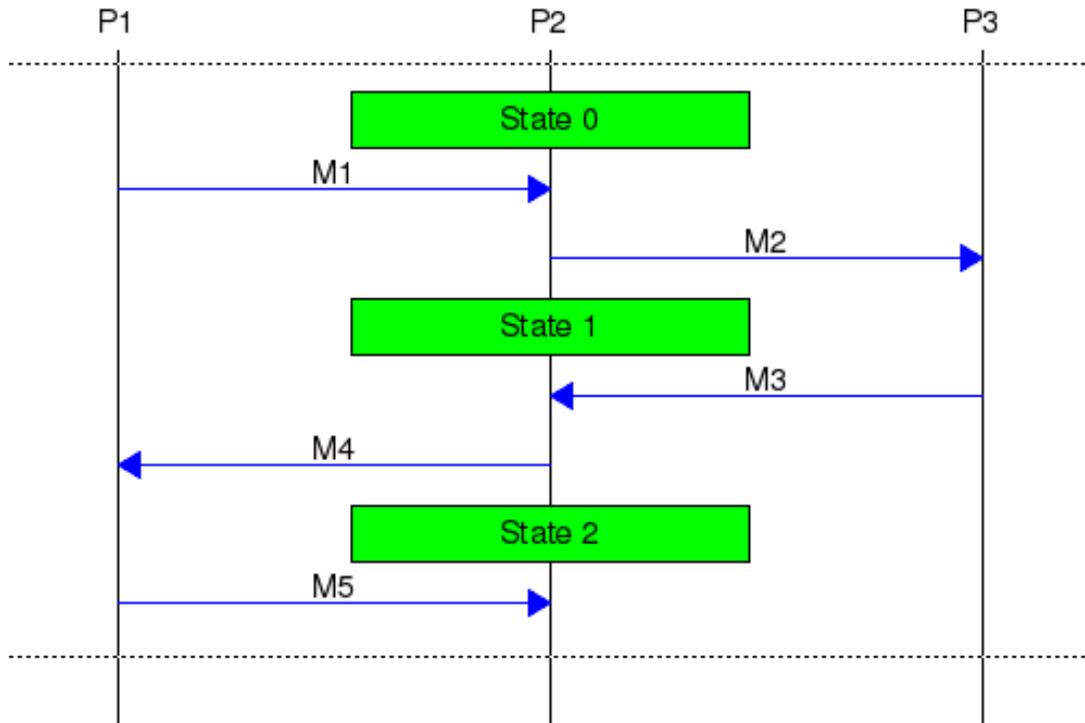
Middle-man processes

- XML specifications
- Code generators

Message sequences

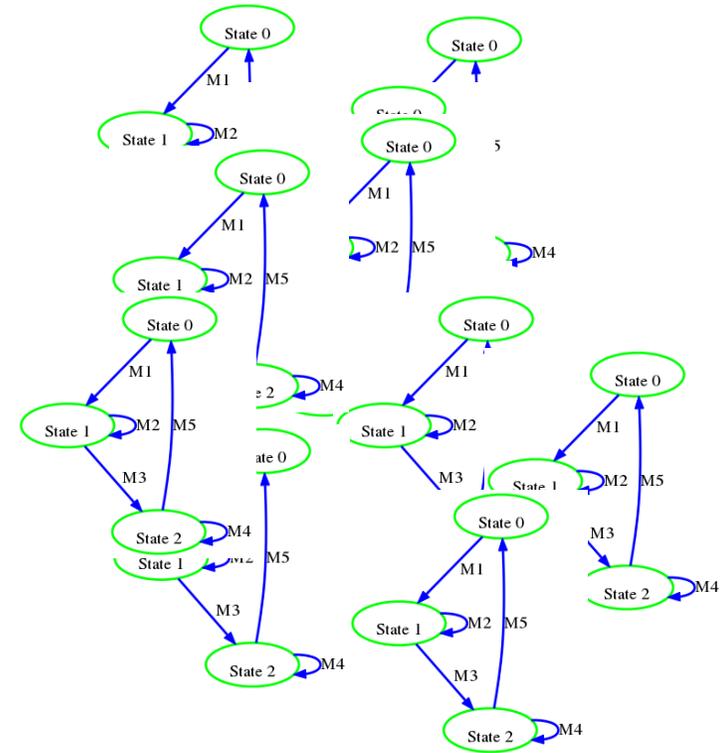
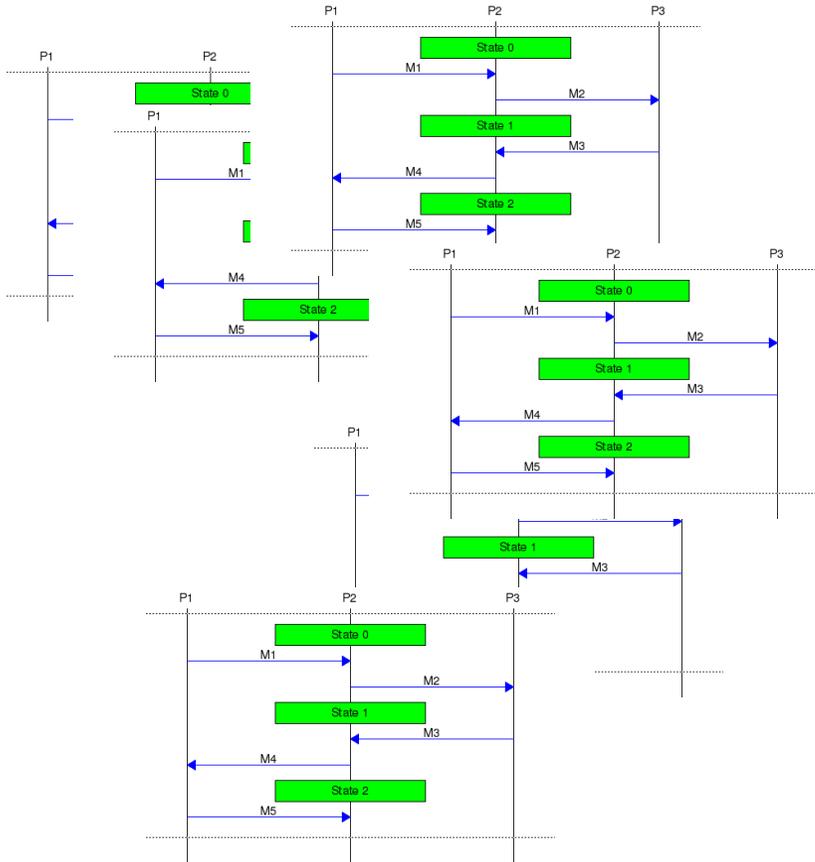


Message sequence to state machine



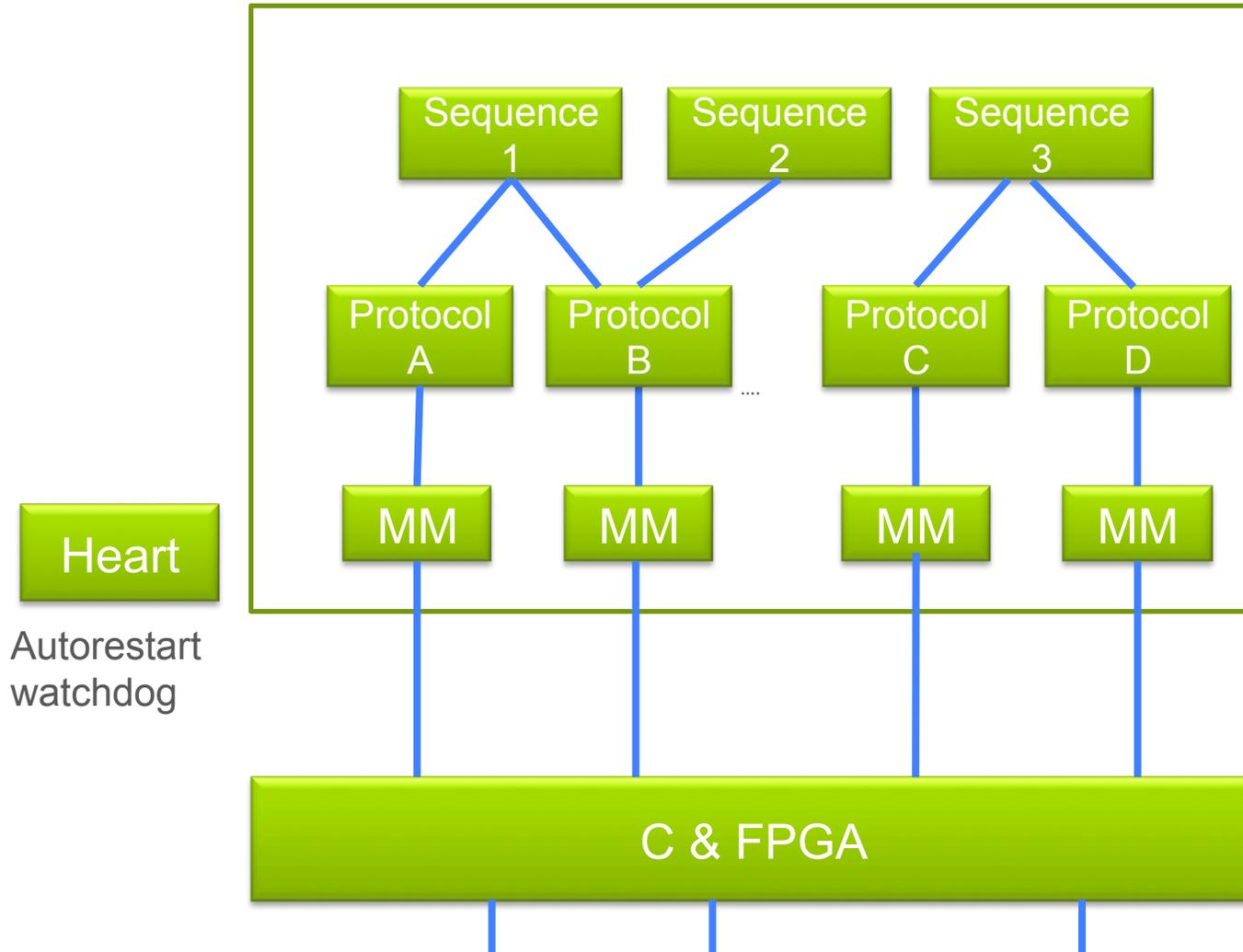
Process P2

Many sequences



Many sequences combined
in process P2

Erlang Process architecture



Sequence handling processes

- CP-AP (Composite procedures and Atomic procedures)
- Feature interaction

Non-blocking protocol processes

- Tail recursive

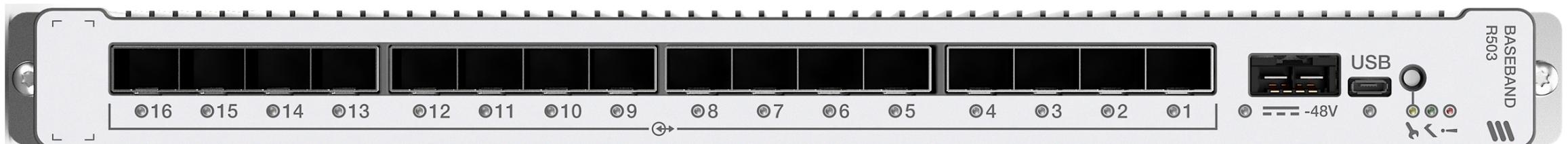
Middle-man processes

- Encode/decode

SUMMARY PART 1



- ✓ Erlang suitable for embedded
- ✓ High productivity
- ✓ SW Architecture
- ✓ Memory footprint
- ✓ Performance
- ✓ Quality





CONNECTING THE next
5 billion