3GPP TSG RAN WG1 Meeting #85
Nanjing, China 23rd - 27th May 2016
Agenda Item: 7.1.5.1

R1-165284

Channel Coding for NR

NTT DOCOMO, INC.

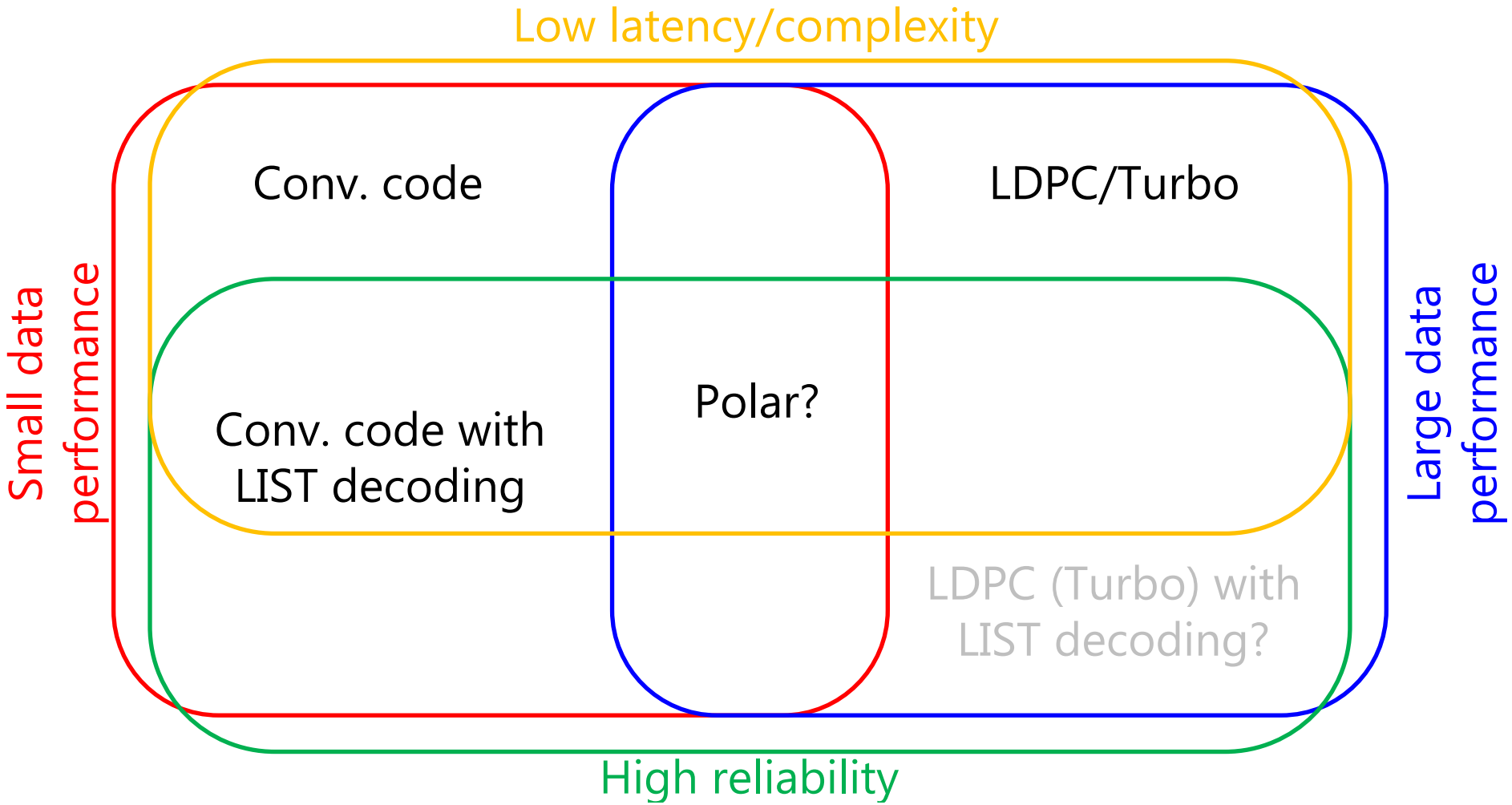
Requirements

- Good performance for variable data size
  - From small data to large data
  - With wide variation of coding rate
  - Support of IR as a baseline
- Low decoding latency/complexity
  - Low complexity may lead to low energy consumption
- Support of ultra high reliability
  - No error floor preferred for URLLC, if retransmission is not allowed

➔ Combination of requirements needs to be considered

Channel Code Candidates

- Multiple codes may be needed for NR to support full combinations of requirements

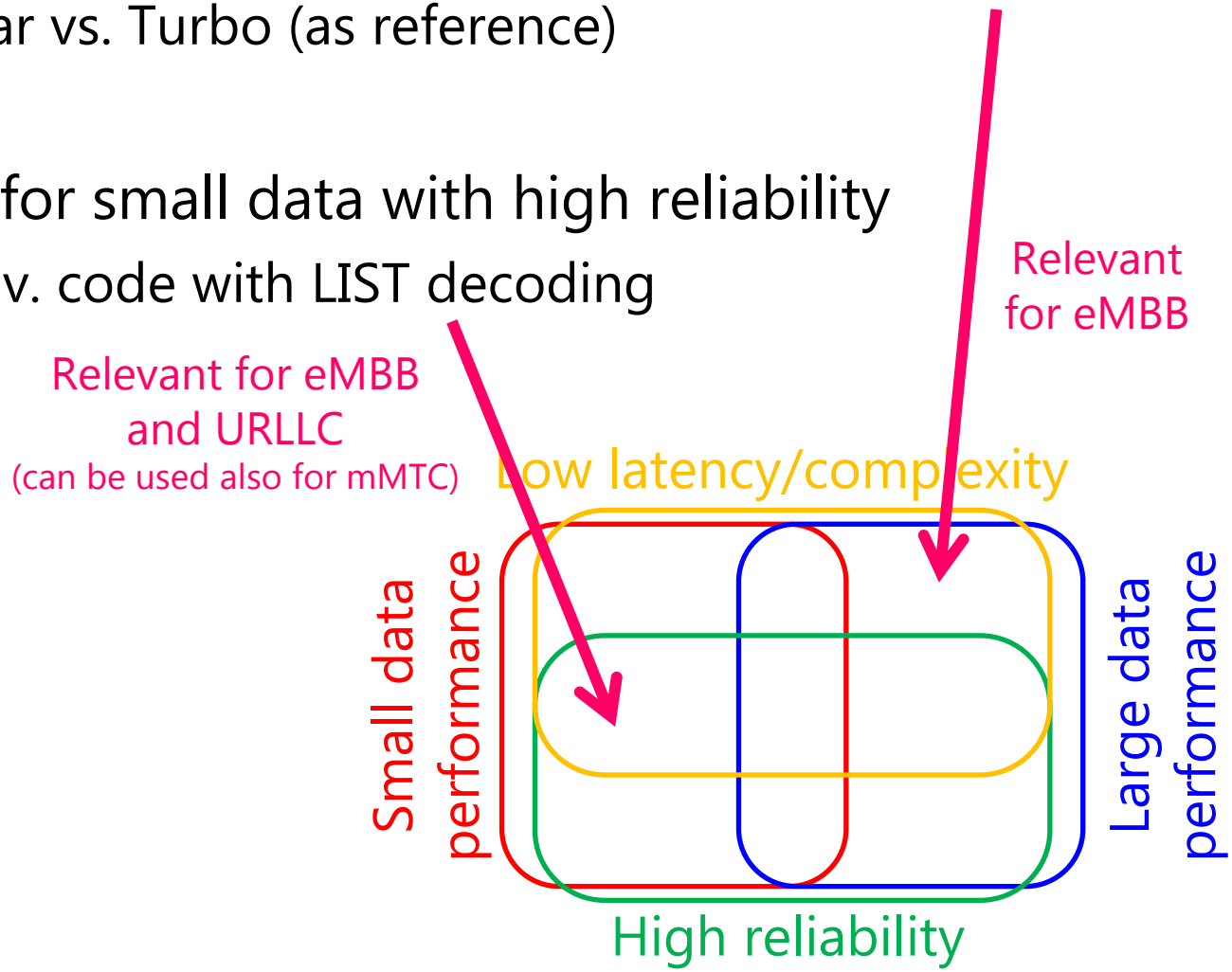


Note: Other coding scheme (if feasible) needs to be checked

Proposed Primary Study Points

- The best code for large data with low latency/complexity
  - LDPC vs. Polar vs. Turbo (as reference)

- The best code for small data with high reliability
  - Polar vs. Conv. code with LIST decoding



Example Combinations

- LDPC (or Turbo) + Polar codes
  - LDPC (or Turbo) for large data with low latency/complexity
  - Polar for small data and/or high reliability
- LDPC (or Turbo) + Conv. codes
  - LDPC (or Turbo) for large data with low latency/complexity
  - Conv. code for small data with low latency/complexity
    - With LIST decoding for high reliability?
- Polar code only (if feasible…)

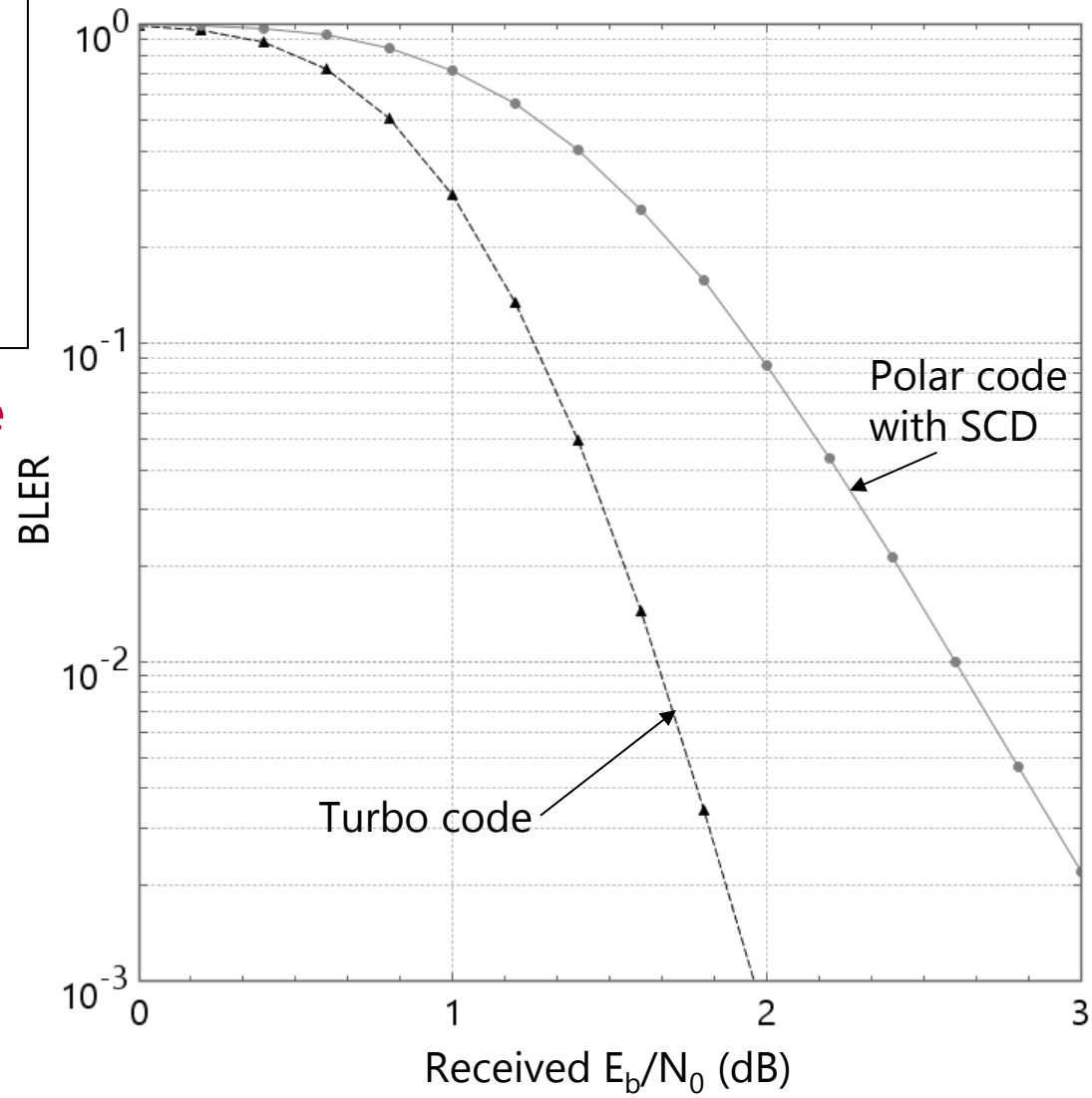
Two schemes at maximum should be supported in NR Phase I

Preliminary Evaluation of Polar Code

Preliminary Evaluation

- Evaluation condition
  - Information bit = 512
  - Coding rate = 1/2
  - LTE Turbo code (8 iterations) as reference

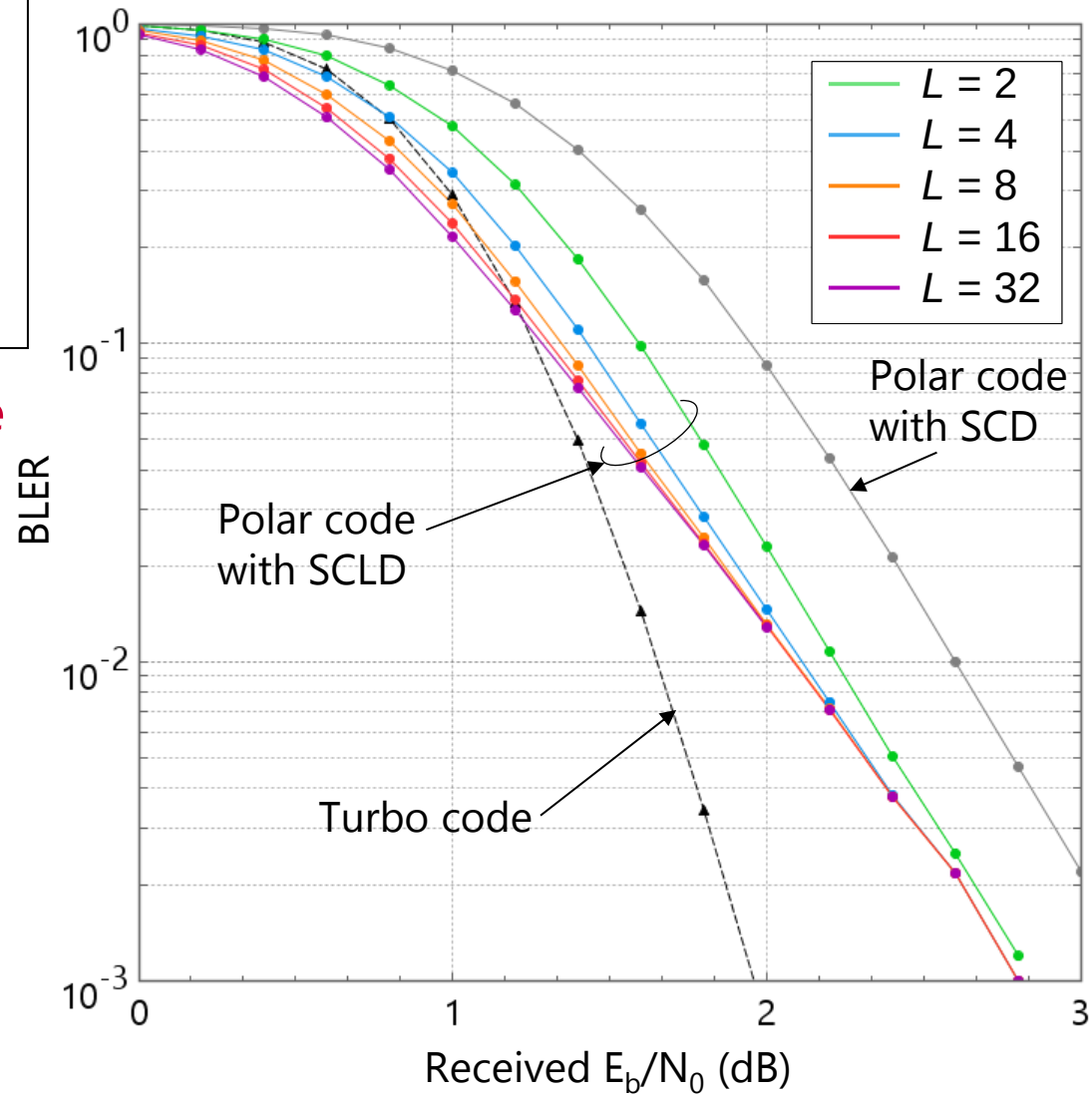
- Polar code with Successive Cancellation Decoder
  - Worse than Turbo code



Preliminary Evaluation

- Evaluation condition
  - Information bit = 512
  - Coding rate = 1/2
  - LTE Turbo code (8 iterations) as reference

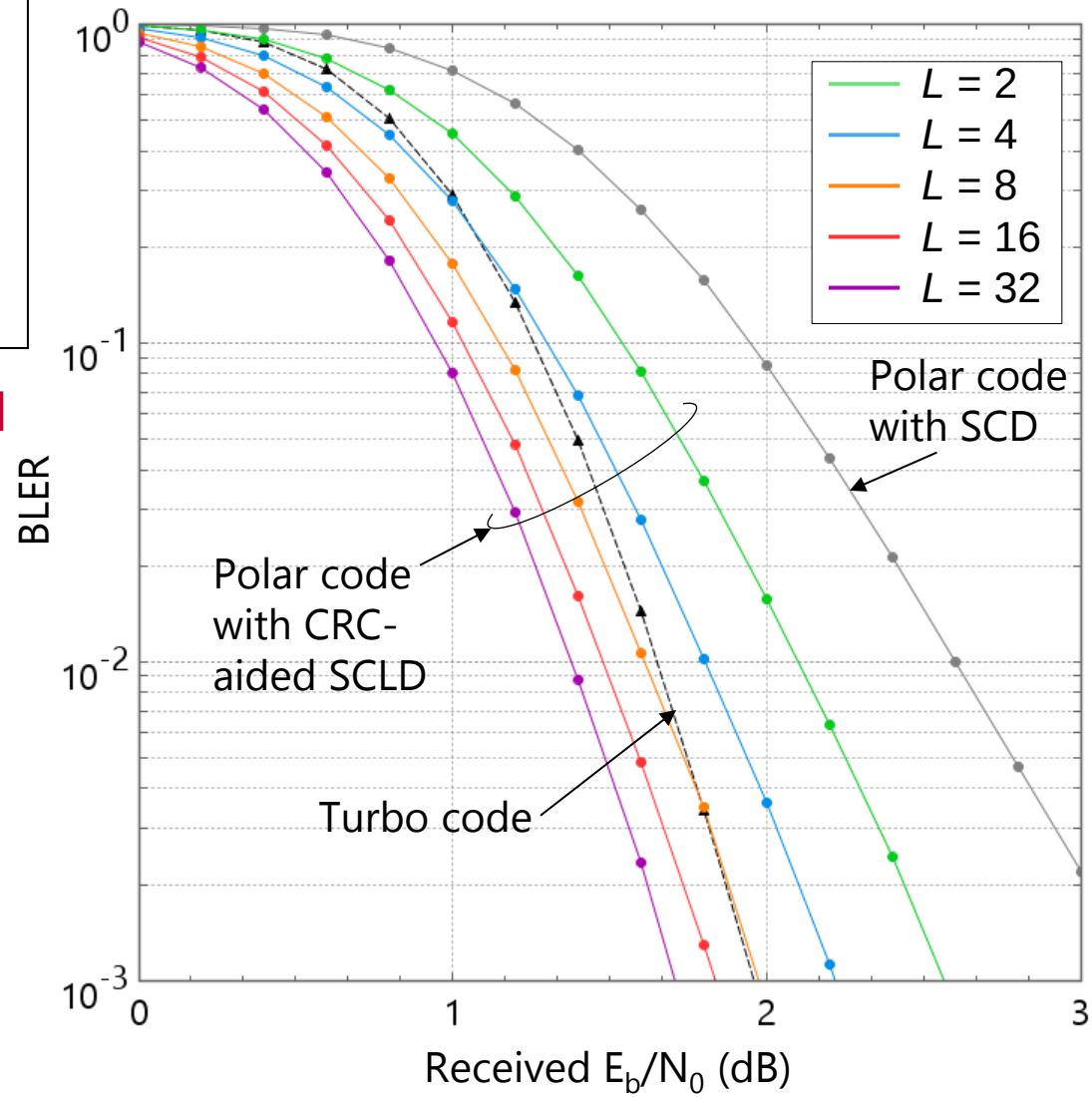
- Polar code with Successive Cancellation List Decoder (SCLD) List size: *L*
  - Still worse than Turbo code



Preliminary Evaluation

- Evaluation condition
  - Information bit = 512
  - Coding rate = 1/2
  - LTE Turbo code (8 iterations) as reference

- Polar code with CRC-aided SCLD List size: *L*
  - Compatible or better than Turbo code



NTT docomo