Removing misconceptions of the DOB proposal through technical analysis

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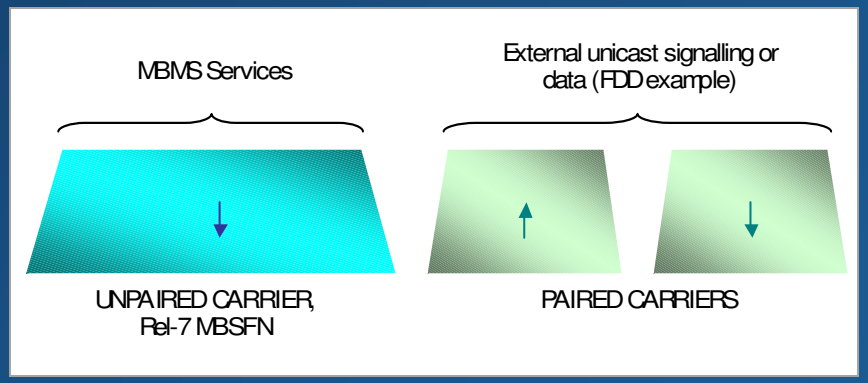
MBSFN Services

- MBSFN services exhibit high asymmetry
  - Use unpaired spectrum for:
    - mixed carrier, MBSFN/unicast or
    - dedicated carrier MBSFN (unicast traffic on other carriers)
- Solution specified in Rel-7
- TDD MBSFN:
  - Some or all timeslots of the carrier used for MBSFN
  - Analogous to LTE MBSFN sub-frames



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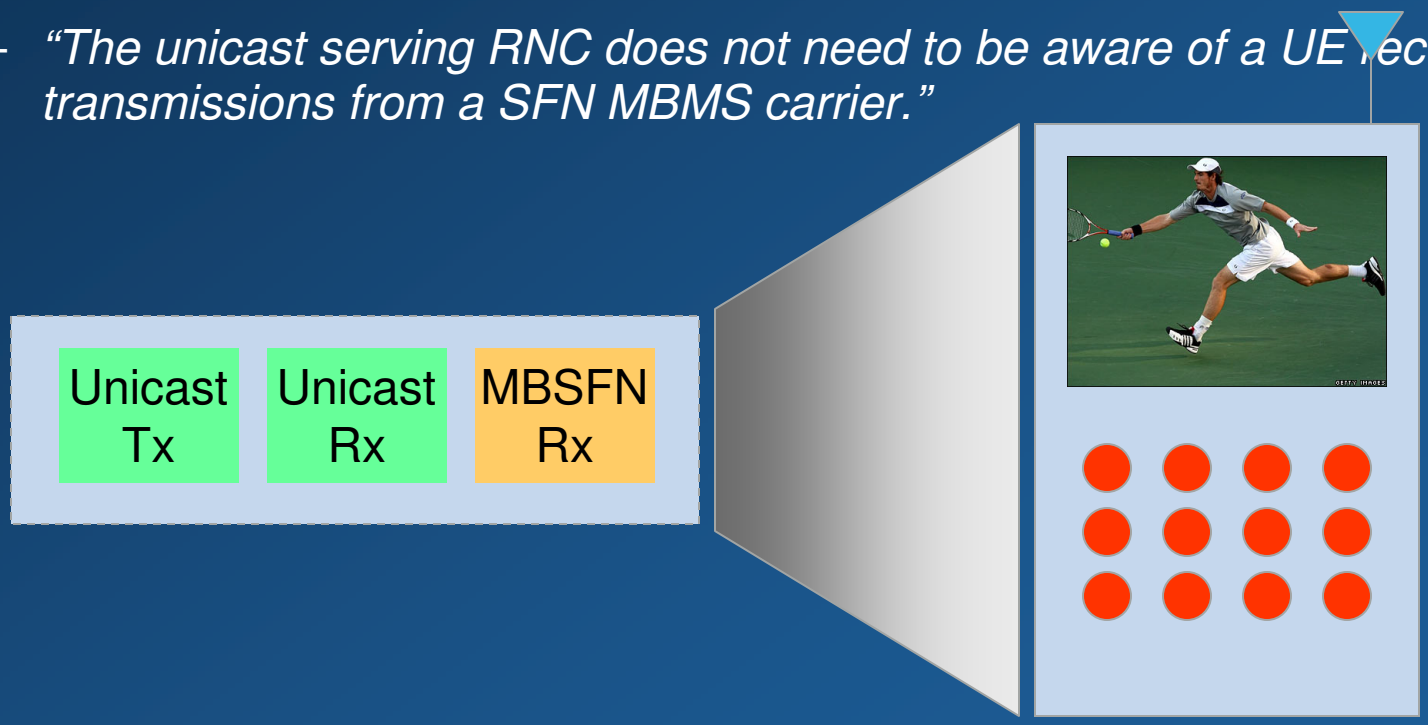
Rel-7 MBSFN Work Items

- FDD MBSFN paired bands, TDD MBSFN unpaired bands
- Two receivers in the UE is the common assumption
  - *"No optimisations are done within this work item for single receiver (one local oscillator) UEs"*
  - *"The unicast serving RNC does not need to be aware of a UE receiving transmissions from a SFN MBMS carrier."*



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Integration of work items

- FDD and TDD MBSFN work items were very closely coupled during 2007
- Some belief that DOB could offer smoother migration for FDD operators
- This needs to be analysed to see whether it is valid
  - RF perspective
  - PHY perspective
  - L2/3 protocols perspective
  - Applications and services

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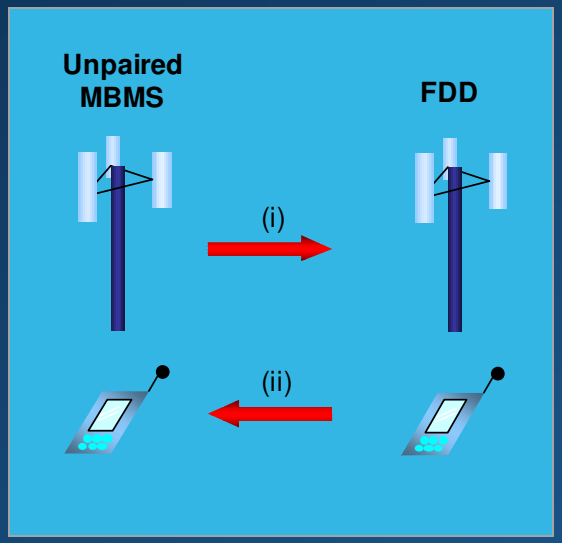
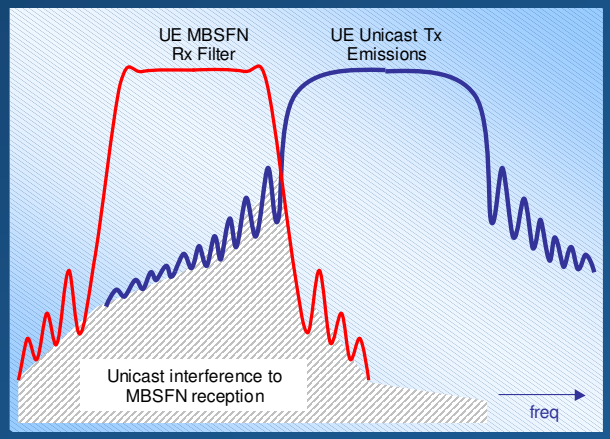
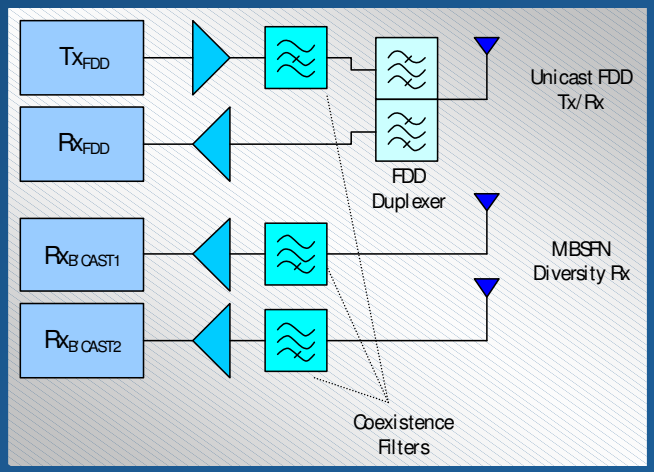
RF

- For same-handset unicast Tx / MBMS Rx, there is the possibility for UE self-interference
- Also BS-BS interference at FDD/TDD frequency borders
- Bands for TDD MBSFN and DOB are the same
- The same RF solutions are required







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Physical Layer

- TDD MBSFN uses
  - Same Physical Channel types for MBSFN as FDD WCDMA
    - P-CCPCH, S-CCPCH, MICH, SCH
  - Same bandwidth (5MHz)
  - Same chip rate
  - OVSF CDMA
    - SF16, SF1
  - Equaliser-based receiver with Rx diversity
    - Type 3 receiver technology (as per HSPA)
  - 3GPP transport channel processing

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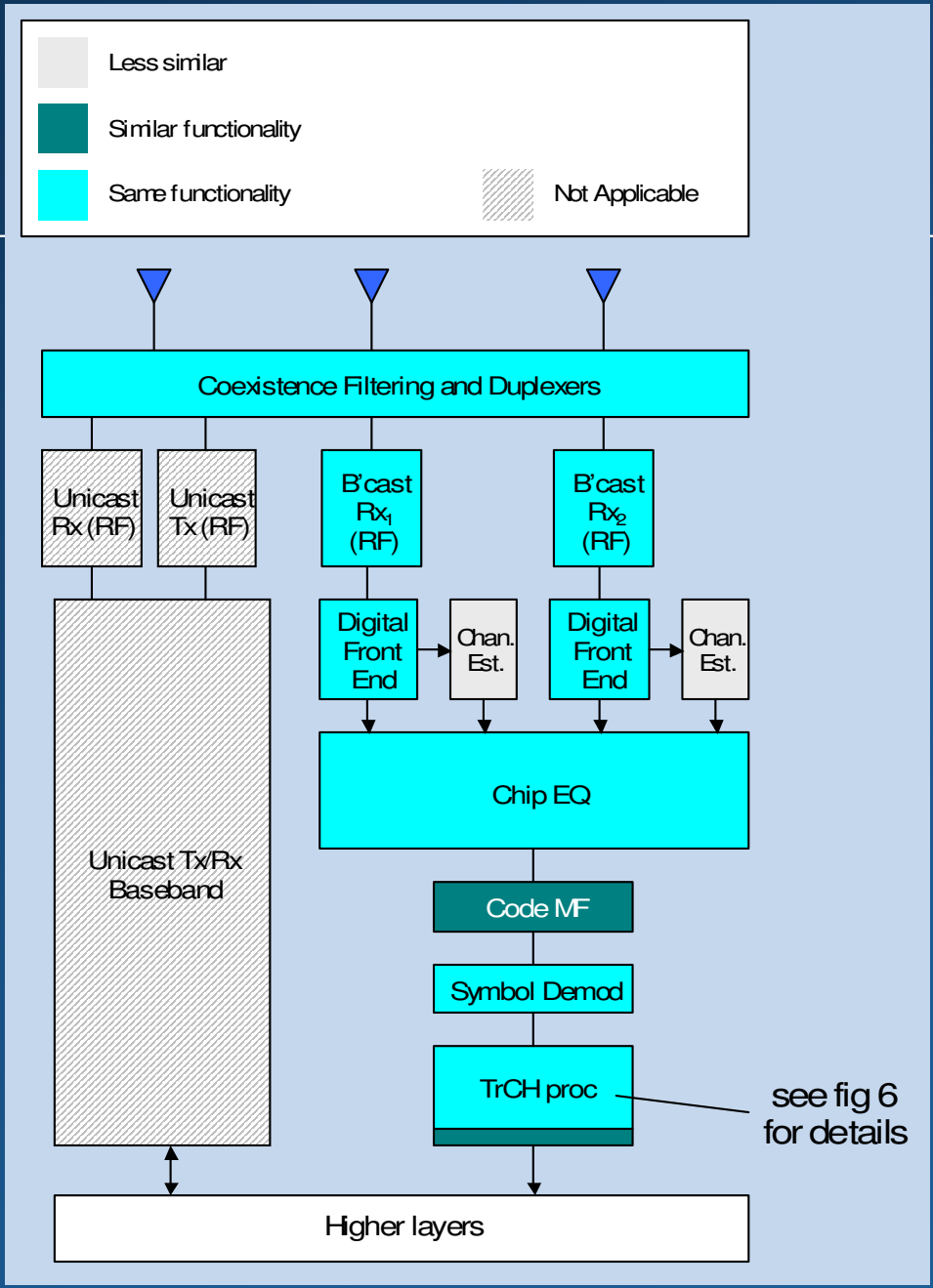
Physical Layer

- UE architecture
- Cyan blocks would be common between a TDD MBSFN UE and a DOB UE
- Patterned blocks are not applicable (unicast Tx/Rx) and may be WCDMA or another technology



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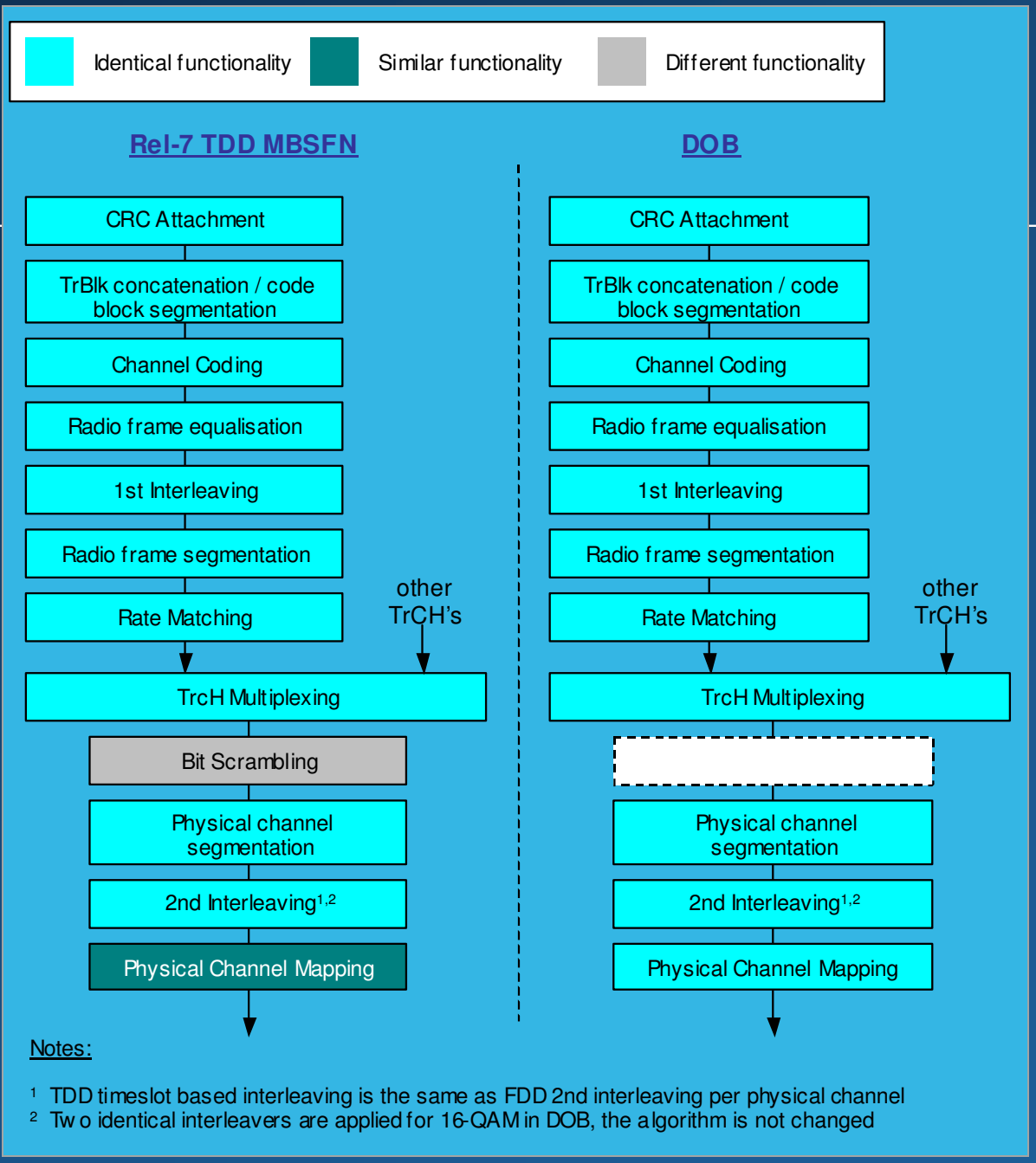
TrCH Proc.



Notes:

[1] TDD timeslot based interleaving is the same as FDD 2nd interleaving per physical channel
[2] Two identical interleavers are applied for 16-QAM in DOB, the algorithm is not changed

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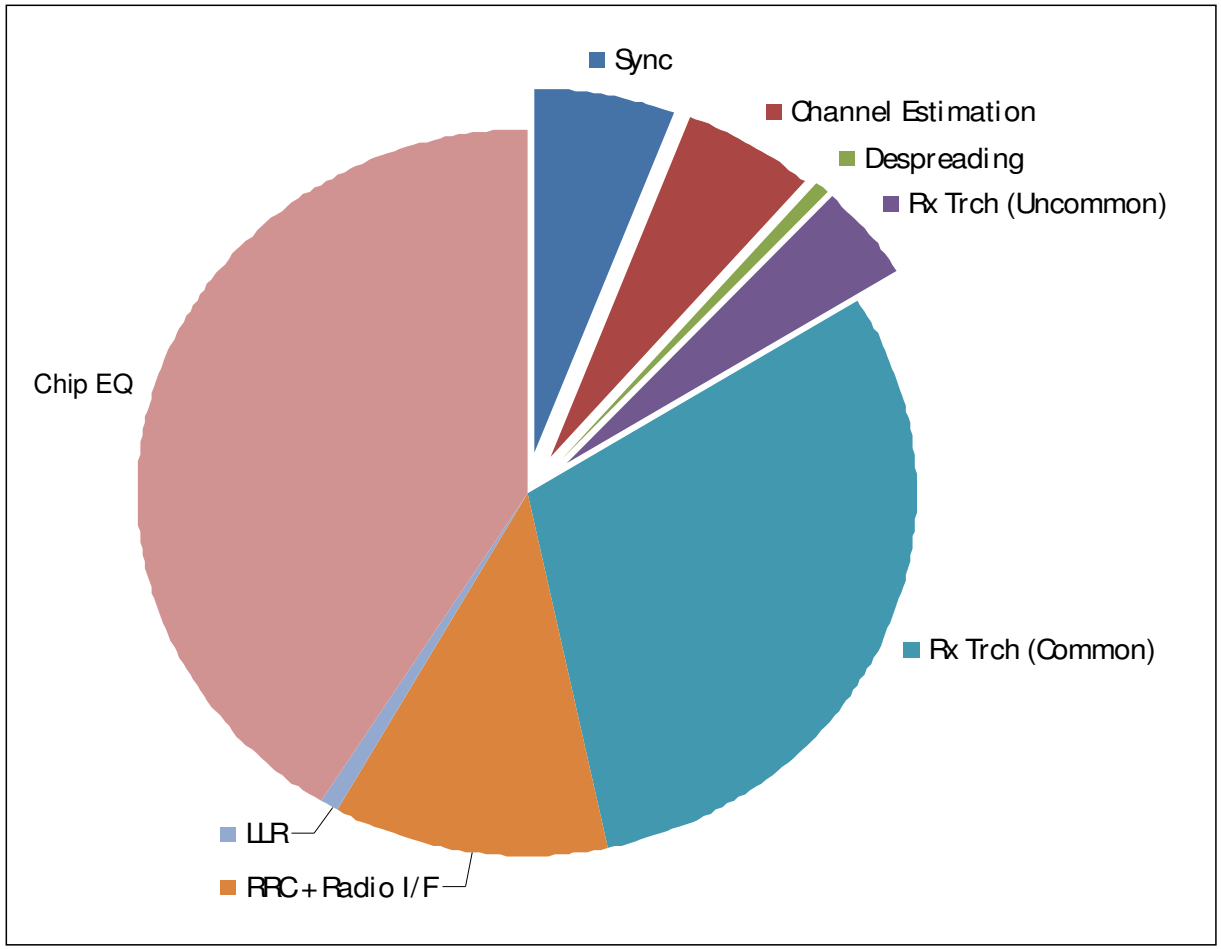
Physical Layer – Summary
84% reuse of existing WCDMA designs



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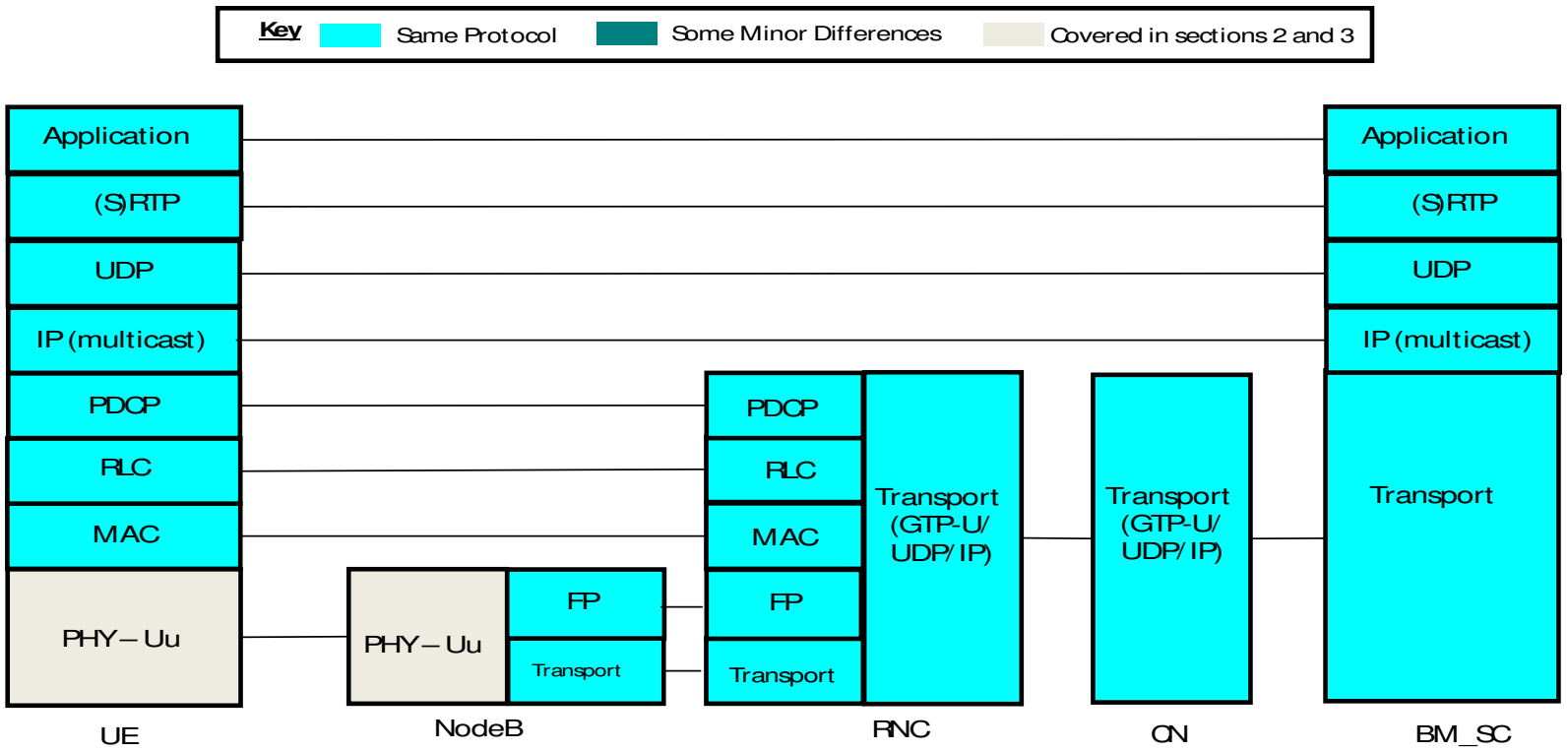
L2/3 Protocols

- User plane identical to DOB



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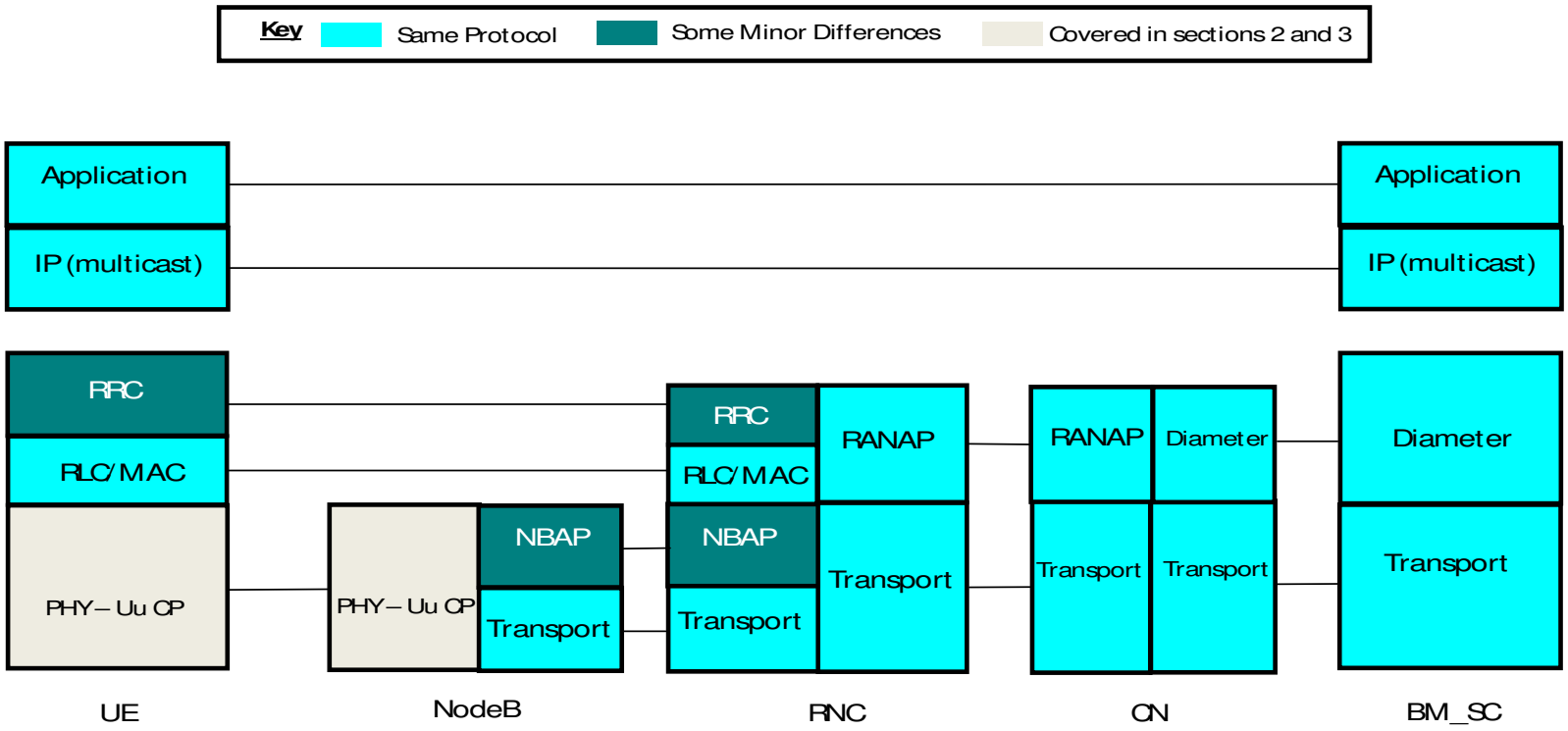
L2/3 Protocols

- Control plane, only minor differences for RRC and NBAP



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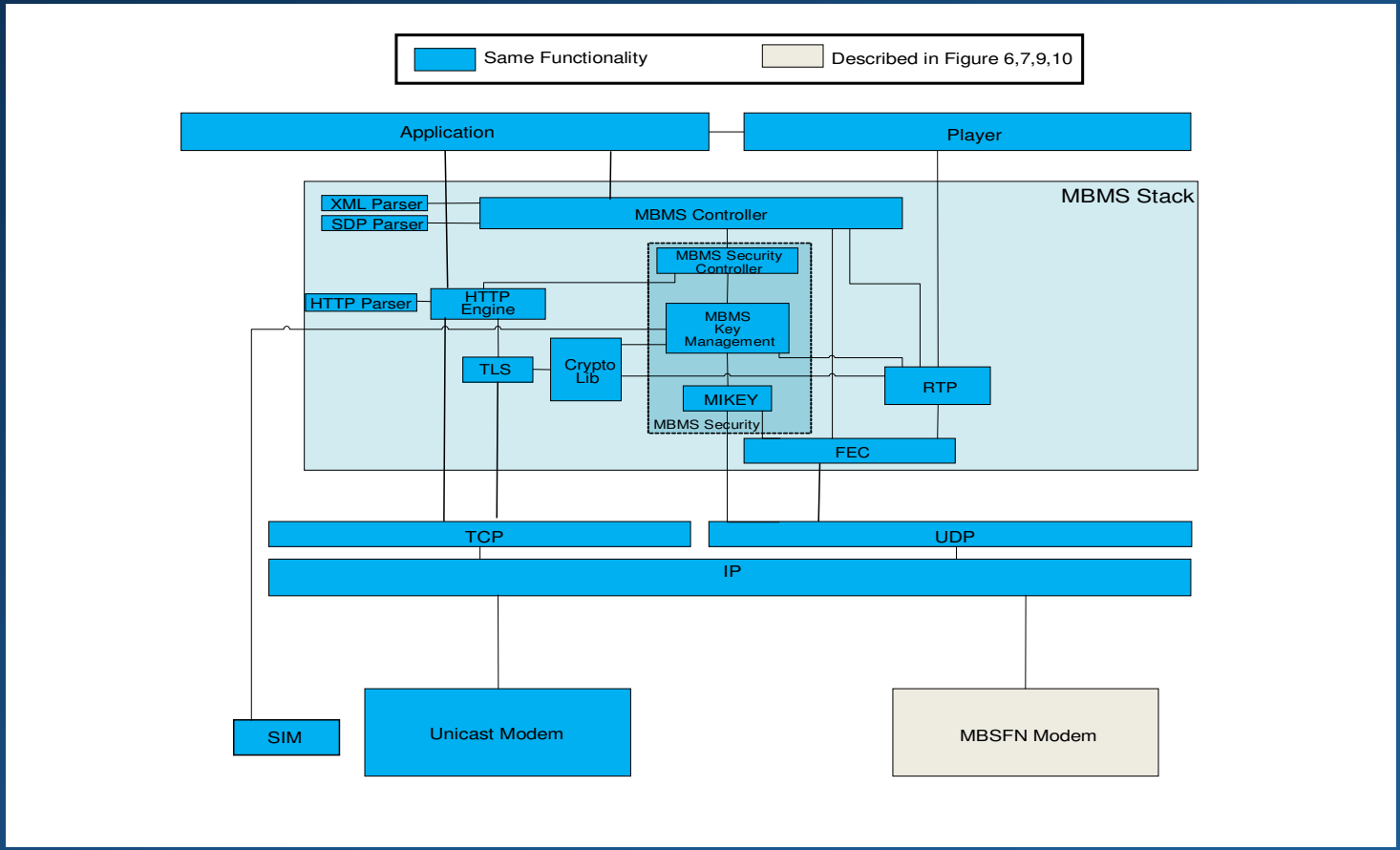
Services and Applications

- Protocols not affected by modem technology



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Conclusion

- RAN WGs did a good job in Rel-7 to fully align the principles of MBSFN operation between paired and unpaired bands (close co-operation throughout both WIs)
- There is a very extensive sharing of functionality which allows for reuse of existing WCDMA infrastructure and terminal designs when applied to MBSFN in unpaired bands
- The differences that exist offer benefits for broadcast that non-3GPP technologies already have
- We hope that companies can understand the joint efforts that went in to ensuring the above alignment in Rel-7 and can build upon this as an integral part of 3GPP
- Thank you for listening...

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Summary of Analysis

Layer	Comparison Findings	
RF	Identical	✓
Physical Layer	84% identical. Differences enable TDD MBSFN to deliver the benefits of [2] – similar advantages brought forward into LTE eMBMS.	✓
Layer 2/3 (RAN Protocols)	User plane identical Control plane, some small differences for TDD MBSFN in RRC[1] and NBAP[1]. [1] Note: DOB also requires differences in these layers	✓
Application (non-RAN) Protocols	Identical	✓

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