LTE-advanced standardization activities

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- Carrier aggregation
- Uplink MIMO
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- Cooperative multiple Points TX/RX (CoMP)
- Relaying functionality

Work plan of LTE-advanced

Work plan for ITU submission

- Submission deadline (RP-080997)

"Complete Technology" summission

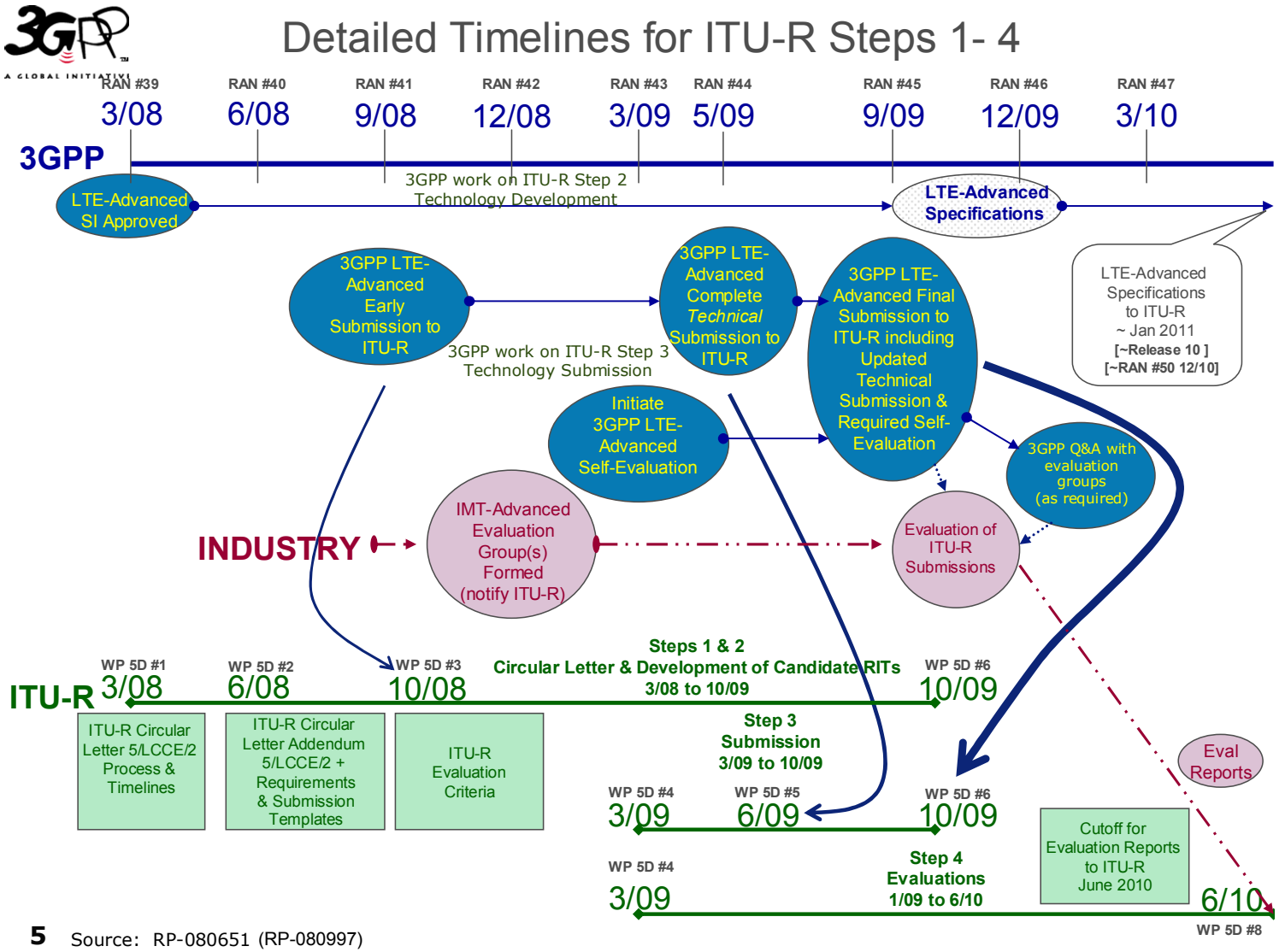
A "Complete Technology" submission to be agreed at RAN #44 (26-29 May 2009), for submission to WP 5D #5 (planned for 10-17 June 2009)

"Final" submission

A "Final" submission to incorporate updates, additional specific details or feature additions, and the required self-evaluation, to be agreed at RAN #45 (22-25 Sep 2009), for submission to WP 5D #6 (planned for 13-20 Oct 2009)

Detailed timeline for ITU-R

- A complete overview of the submission and evaluation process

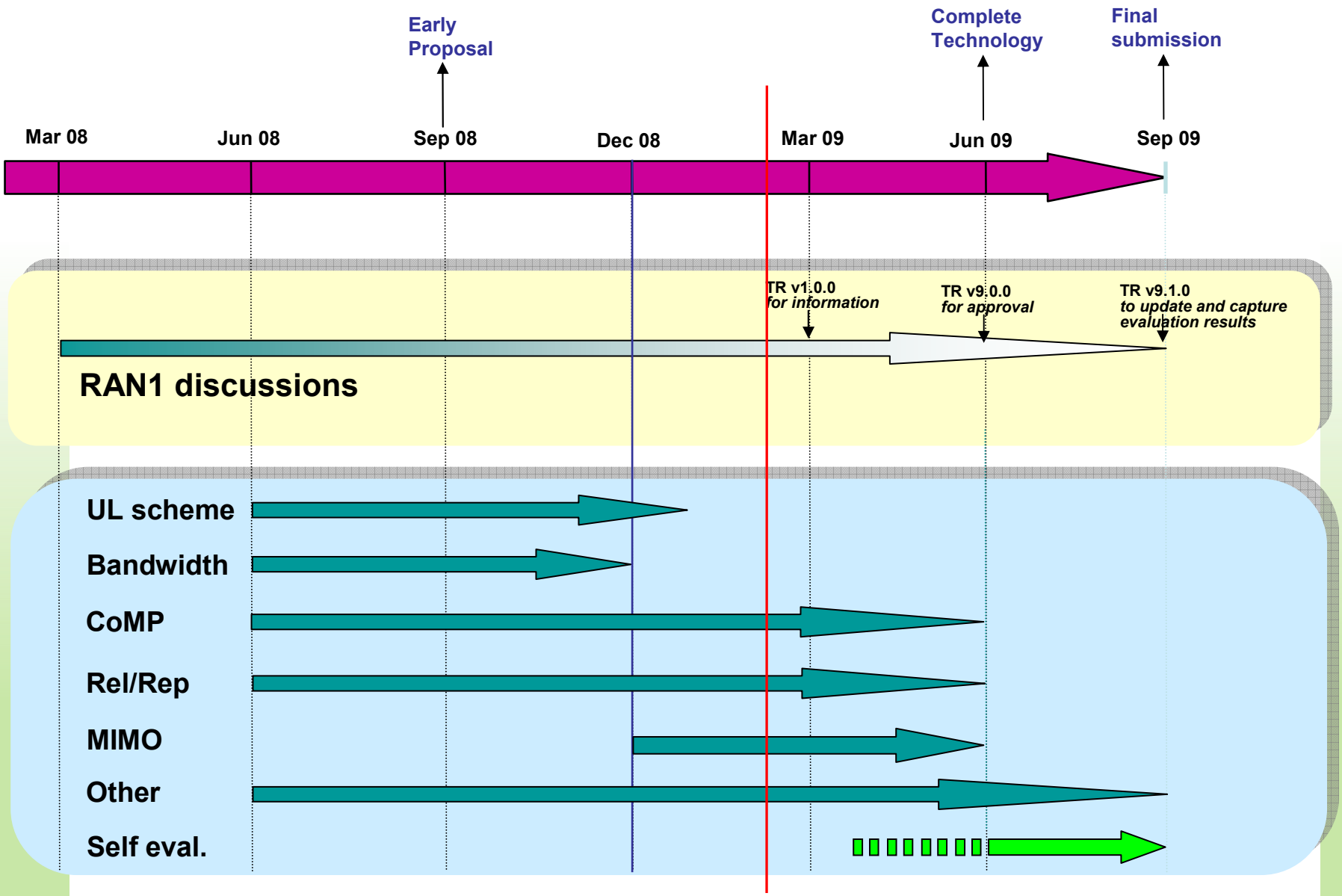


5 Source: RP-080651 (RP-080997)

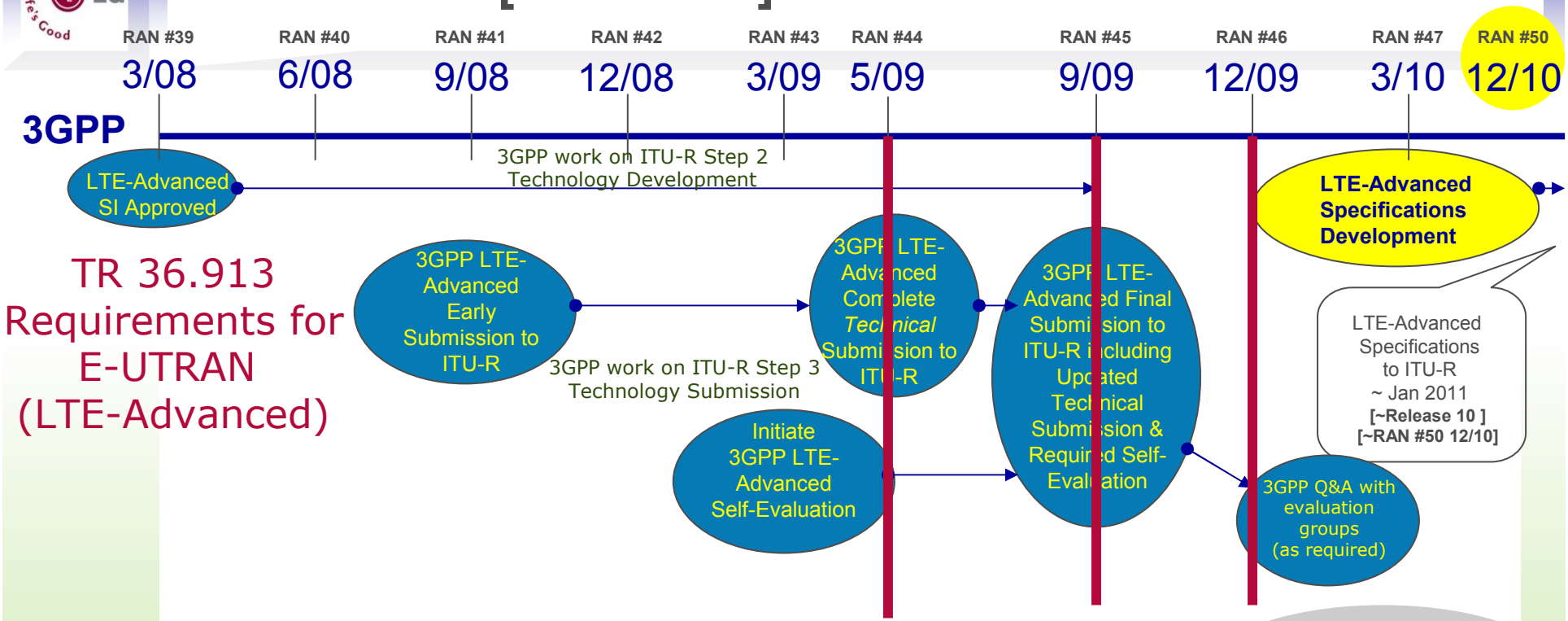
Basic process for LTE-advanced technology description

- Process agreed in RP-080997
- RAN WGs to **focus** on progressing the technical discussion
  - WGs should not work on details on TDT
  - Capture relevant parts in TR 36.814
- LTE-advanced Rapporteur to prepare draft technology description
  - Based on progress in WGs
  - First draft to be provided based on LTE as specified in Rel-8
  - Updated version to be provided based on agreements on LTE-advanced
- RAN WGs to review/endorse technology description at the May meeting
- ITU-AH prepares technology description template for approval at RAN plenary in June

LTE-advanced schedule for RAN1



3GPP [TR 36.912] DEVELOPMENT PLAN



Scope: Consider using similar document structure from TR 25.912 for [TR 36.912] document where appropriate

Timing: TR initial draft May 2009

[TR 36.912] Feasibility Study for E-UTRAN (LTE Advanced)

Note:
Include the 3GPP Submissions to ITU-R (Text & Completed Templates, Self Evaluation, etc) as Annex(s) to [TR36.912]

Leading WG: RAN1

LTE rapporteurs in each WG should support the TR development

Completion of LTE-Advanced Study Item is scheduled for Sept 09 per RP 080137

ITU-R requirements for IMT-advanced

ITU-R requirements for IMT-advanced

- Bandwidth: 40 MHz
  - Single or multiple RF carrier
- Peak spectral efficiency
  - Downlink: 15 bps/Hz
  - Uplink: 6.75 bps/Hz
- Cell spectral efficiency
  - Assumption: DL 4x2, UL 2x4

Test environment **	Downlink (b/s/Hz/cell)	Uplink (b/s/Hz/cell)
Indoor	3	2.25
Microcellular	2.6	1.80
Base coverage urban	2.2	1.4
High speed	1.1	0.7

ITU-R requirements for IMT-advanced

- Cell edge spectral efficiency
  - Assumption: DL 4x2, UL 2x4

Test environment* *	Downlink (b/s/Hz)	Uplink (b/s/Hz)
Indoor	0.1	0.07
Microcellular	0.075	0.05
Base coverage urban	0.06	0.03
High speed	0.04	0.015

ITU-R requirements for IMT-advanced

- Test environments
  - Indoor: stationary, pedestrian
  - Microcellular: stationary, pedestrian, vehicular (up to 30 Km/h)
  - Base coverage urban: stationary, pedestrian, vehicular
  - High speed: vehicular, high speed vehicular
- VoIP capacity

Test environment**	Min VoIP capacity (Active users/sector/MHz)
Indoor	50
Microcellular	40
Base coverage urban	40
High speed	30

LTE-advanced components focus areas

LTE-advanced components focus areas

- Bandwidth extension
  - Concept agreed already
  - Principles for signalling support
- Uplink access scheme
  - Concept agreed already (SC-FDMA)
- CoMP
  - RS structure for support of COMP, discuss together with RS for MIMO
  - Feedback signalling principles, estimate of overhead
- MIMO
  - Framework on reference signal structure, discuss together with RS for CoMP
  - UL/DL antenna configurations
    - ✓ Already covered in TR.
  - Transmission modes (for new configurations)
    - ✓ Codebook/non-codebook
    - ✓ Number of codewords
    - ✓ Feedback

LTE-advanced components focus areas

- Relaying
  - What types to be supported
    - ✓ Discussion will continue in RAN2/3
    - ✓ Fake MBSFN and other scheme
- Self evaluation
  - For ITU and 3GPP internal
  - Start May 2009, finish in August
    - ✓ LTE-A concept for evaluation stable

LTE-advanced components focus areas

- Further advancements of LTE (E-UTRA)
  - Support of wider bandwidth
    - ✓ Carrier/bandwidth aggregation
  - Uplink transmission scheme
    - ✓ Uplink spatial multiplexing
  - Downlink transmission scheme
    - ✓ Downlink spatial multiplexing
  - Coordinated multiple point transmission and reception (CoMP)
    - ✓ Downlink/Uplink
  - Relaying functionality
  - Further MBMS
  - Mobility
  - Evaluation of techniques for advanced E-UTRA

Carrier aggregation

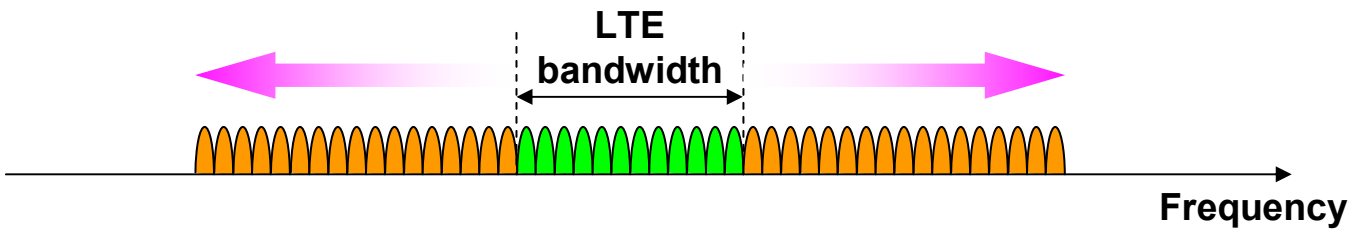
Overview

- Carrier aggregation
  - Support wider bandwidth
  - Two or more component carriers
  - Up to 100MHz and for spectrum aggregation
  - Each component carrier limited to a maximum of 110 RBs
  - Using Rel'8 numerology
- Carrier aggregation type
  - Contiguous
  - Non-contiguous

Overview

- Concept of carrier aggregation

Contiguous component carrier



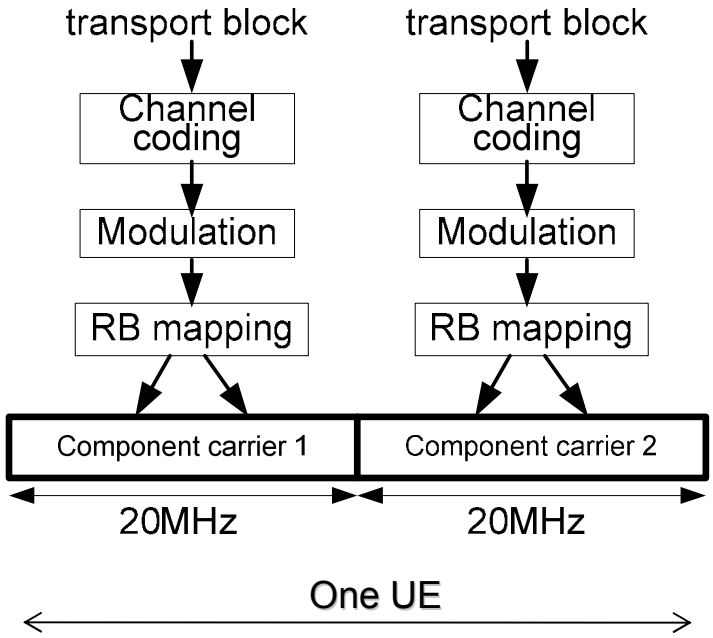
Non-contiguous component carrier

Overview

- UE capability regarding carrier aggregation
  - LTE-A UE
    - ✓ Simultaneous transmission/reception on multiple component carrier
    - ✓ Depends on the transmission/reception capability
  - Rel'8 UE
    - ✓ Transmission on a single component carrier only, provided that the structure of the component carrier follows the Rel-8 specifications.
- Characteristics of component carrier
  - It shall be possible to configure all component carriers LTE Release 8 compatible at least when the aggregated numbers of component carriers in the UL and the DL are same
  - Consideration of non-backward-compatible configurations of LTE-A component carriers is not precluded (CC only for LTE-A)

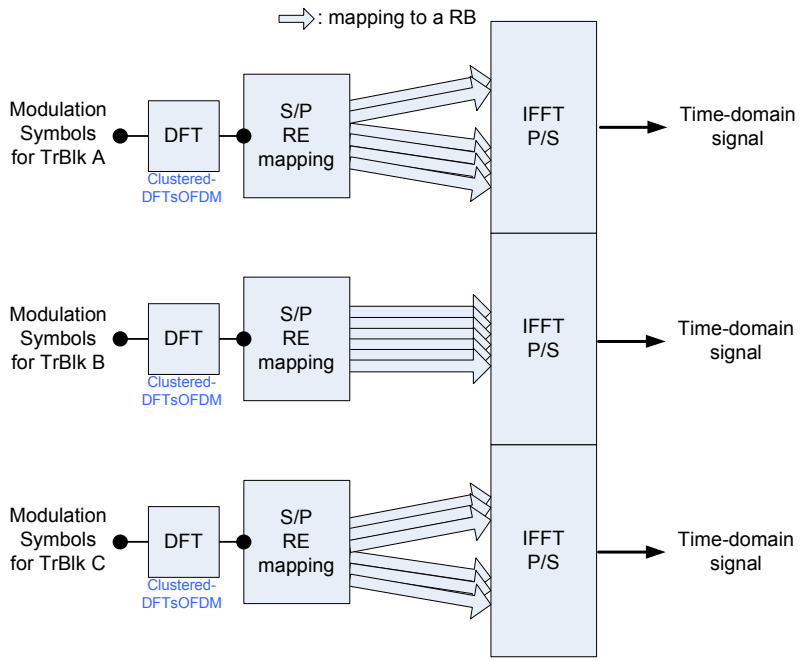
MAC-PHY interface

- From a UE perspective
  - There is one transport block (in absence of spatial multiplexing)
  - One hybrid-ARQ entity per scheduled component carrier.
- Each transport block is mapped to a single component carrier
- A UE may be scheduled over multiple component carriers simultaneously.



Uplink multiple access

- SC-FDMA is the transmission scheme used for PUSCH
  - One DFT per component carrier
  - Supported for spatial multiplexing
- Resource allocation
  - Frequency-contiguous
  - Frequency-non-contiguous

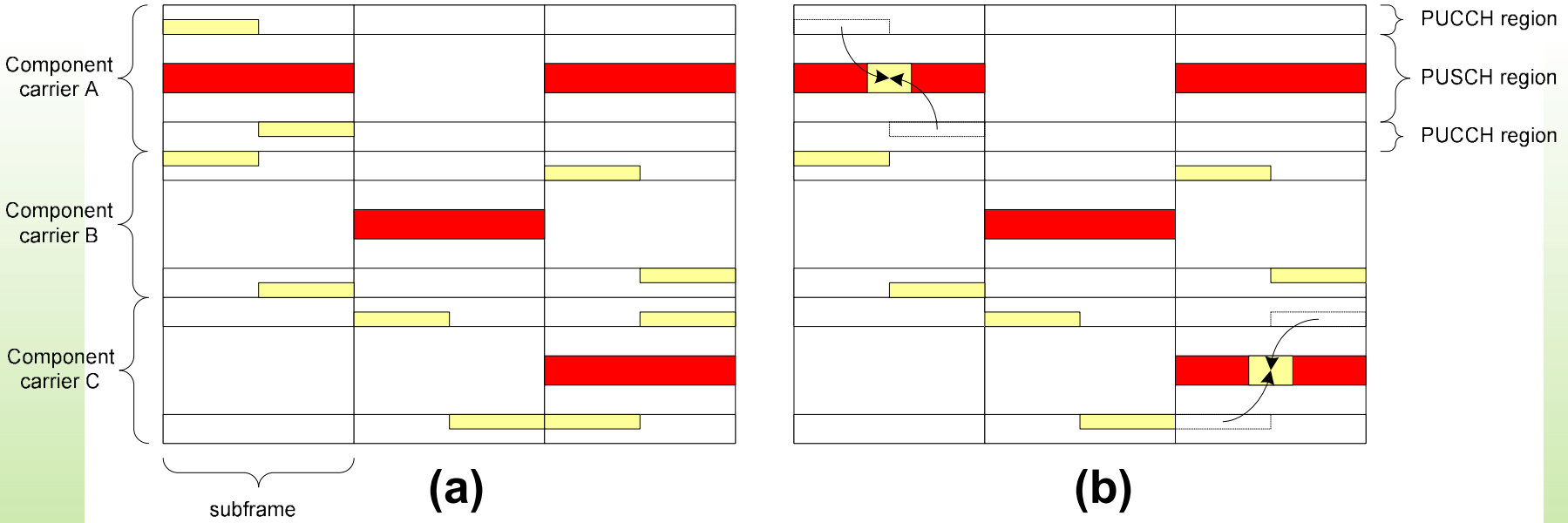


Uplink multiple access

- Uplink multiplexing of L1/L2 control signalling and data
  - Control signalling is transmitted on PUCCH simultaneously with data on PUSCH
  - Control signalling is multiplexed with data on PUSCH according to the same principle as in Rel-8

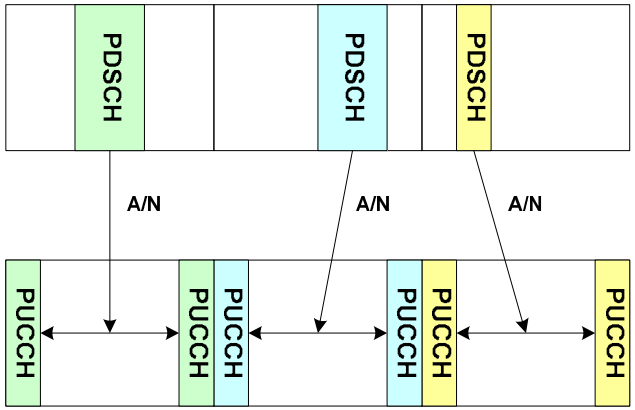
Uplink multiple access

- Multiplexing options
  - (a) Simultaneous Tx of PUCCH and PUSCH
  - (b) Same principle as in Rel-8



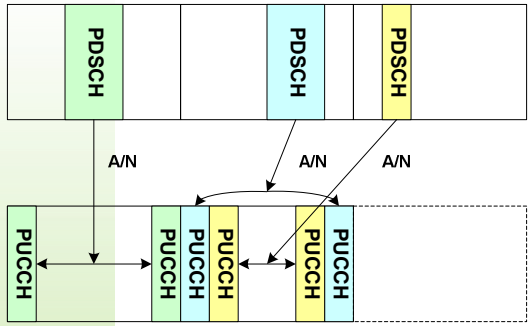
Uplink control channel

- ACK/NACK
  - Multiple ACK/NACKs on multiple component carriers
    - ✓ Reuse LTE Rel-8 scheme per CC

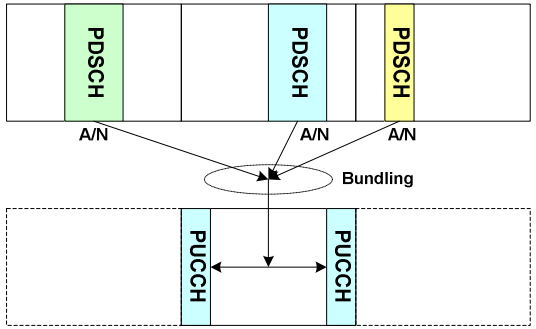


Uplink control channel

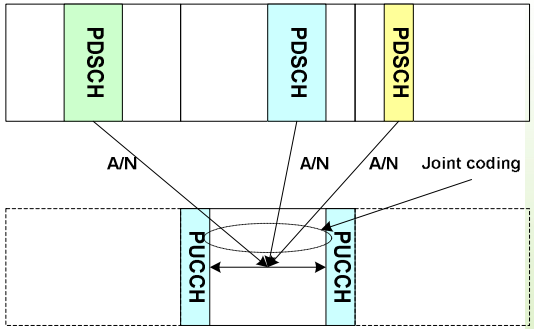
- Multiple ACK/NACKs on single component carrier
  - ✓ Multiple resources transmission
  - ✓ Bundling or channel selection
  - ✓ Joint coding



Multiple resources transmission



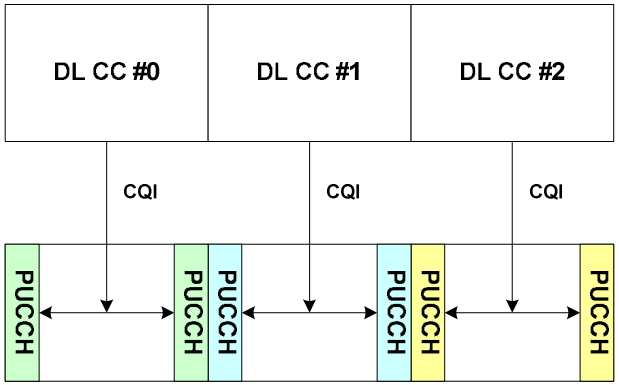
Bundling



Joint coding

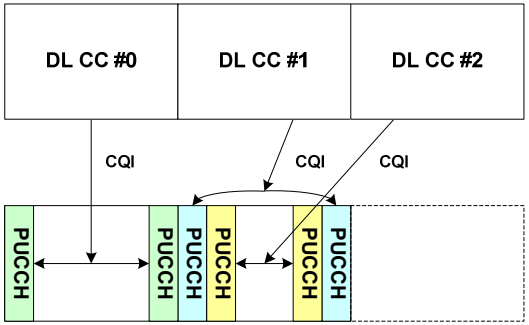
Uplink control channel

- CQI (Channel Quality Indication)
  - Multiple CQIs on multiple component carriers
    - ✓ Reuse LTE Rel-8 scheme per CC

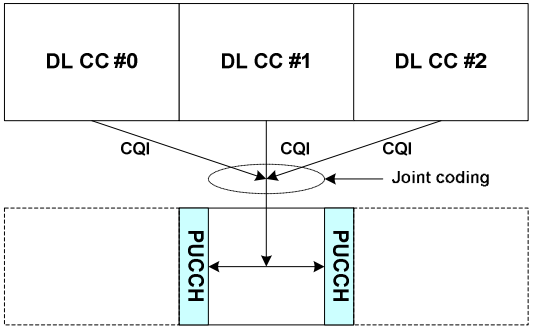


Uplink control channel

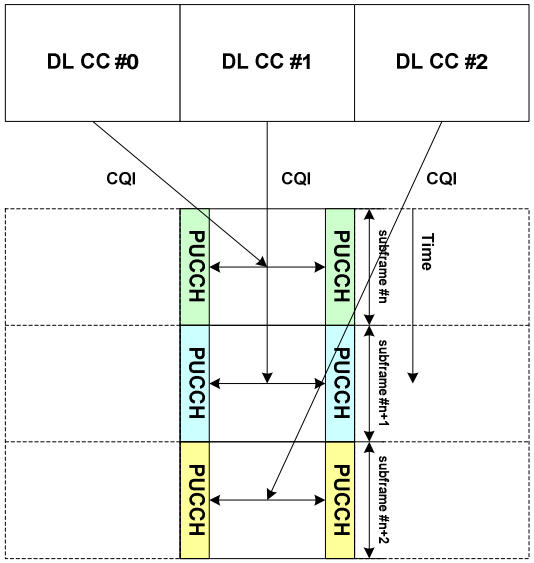
- Multiple CQIs on single component carrier
  - ✓ Multiple resources transmission
  - ✓ Joint coding
  - ✓ TDM



Multiple resources transmission



Joint coding



TDM

Uplink control channel

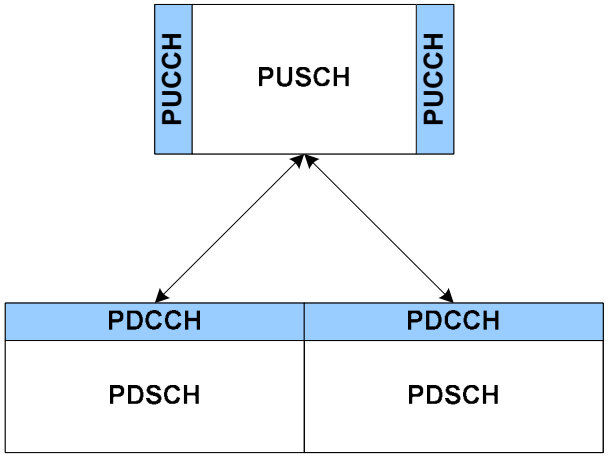
- SR (Scheduling request)
  - Single SR per UE vs. SR per component carrier
  - Multiple SR bits

Downlink control channel

- PDCCH is transmitted within one component carrier
- Mapping of PDCCH information
  - Separate PDCCH at each component carrier
    - ✓ One PDCCH indicates same component carrier
    - ✓ One PDCCH indicates same or different component carrier
    - ✓ Overhead increase corresponds to the number of component carrier
  - Common PDCCH on one component carrier
    - ✓ Jointly encoded
    - ✓ PDCCH indicates multiple component carriers
- Issue points of PDCCH mapping
  - Overhead reduction
  - Error propagation
  - Scheduling flexibility
  - Blocking probability
  - PDCCH blind decoding reduction

Downlink control channel

- PHICH transmission
  - Symmetric carrier aggregation
    - ✓ Reuse LTE Rel-8 scheme per CC
  - Asymmetric carrier aggregation (DL > UL)



    - ✓ Single CC transmits PHICH linked to the UL PRB
      - PHICH transmission on the DL CC linked with the corresponding UL CC
      - PHICH transmission on the DL CC which PDCCH for UL grant was received.
    - ✓ All the CCs transmit PHICH linked to the UL PRB

Uplink MIMO

UL MIMO

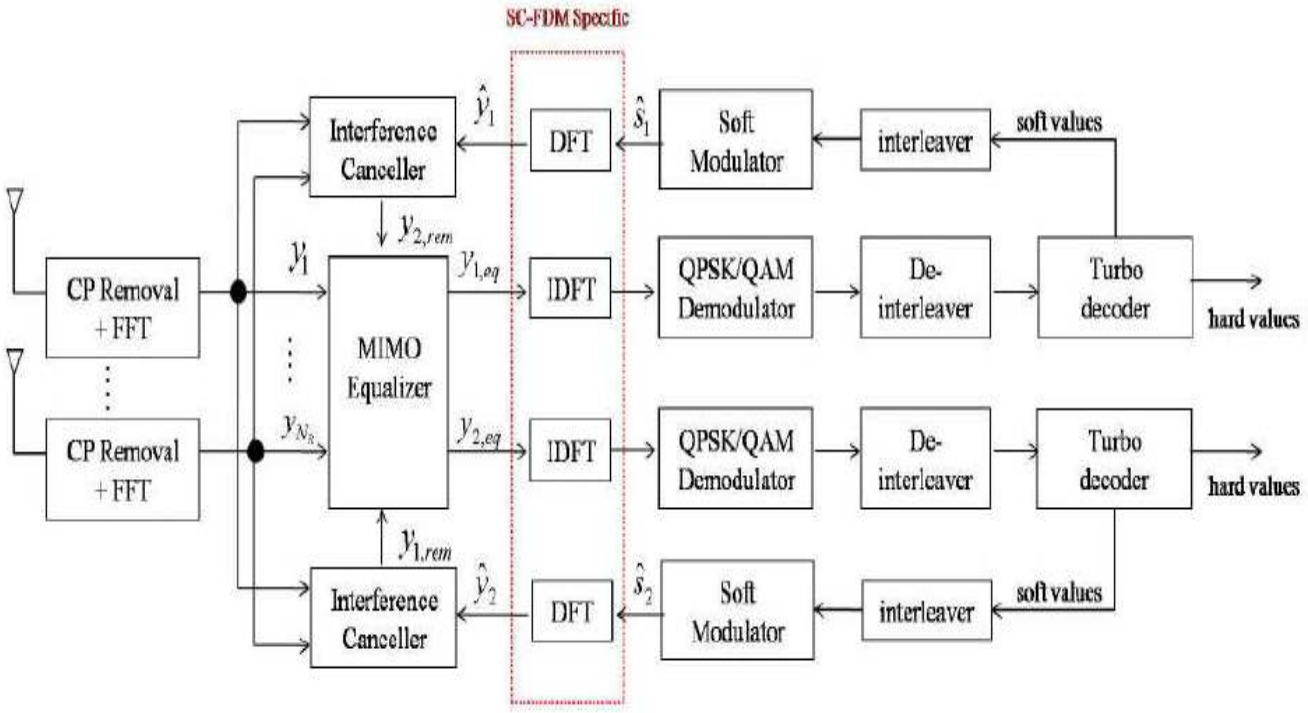
- The number of transmit antennas in UL: up to 4
- Design issue
  - Multiple access scheme
  - Number of codewords
  - Precoder design
  - Transmit diversity

Multiple access scheme for UL MIMO

- SC-FDMA vs. OFDMA
  - Complexity
    - ✓ SC-FDMA: turbo SIC
    - ✓ OFDMA: maximum likelihood detector (MLD)
    - ✓ MLD is more complex in 16/64 QAM, especially for 4x4 configuration
  - Latency
    - ✓ Depends on computational complexity
    - ✓ SC-FDMA and OFDMA may not give significant difference
  - Performance
    - ✓ OFDMA shows gain over SC-FDMA in high SNR range for 2x2 configuration
    - ✓ Similar performance for 2x4 configuration
    - ✓ OFDMA shows system level gain over SC-FDMA in 2x2 and 4x4 configuration
  - SC-FDMA was adopted for multiple access scheme as UL MIMO transmission

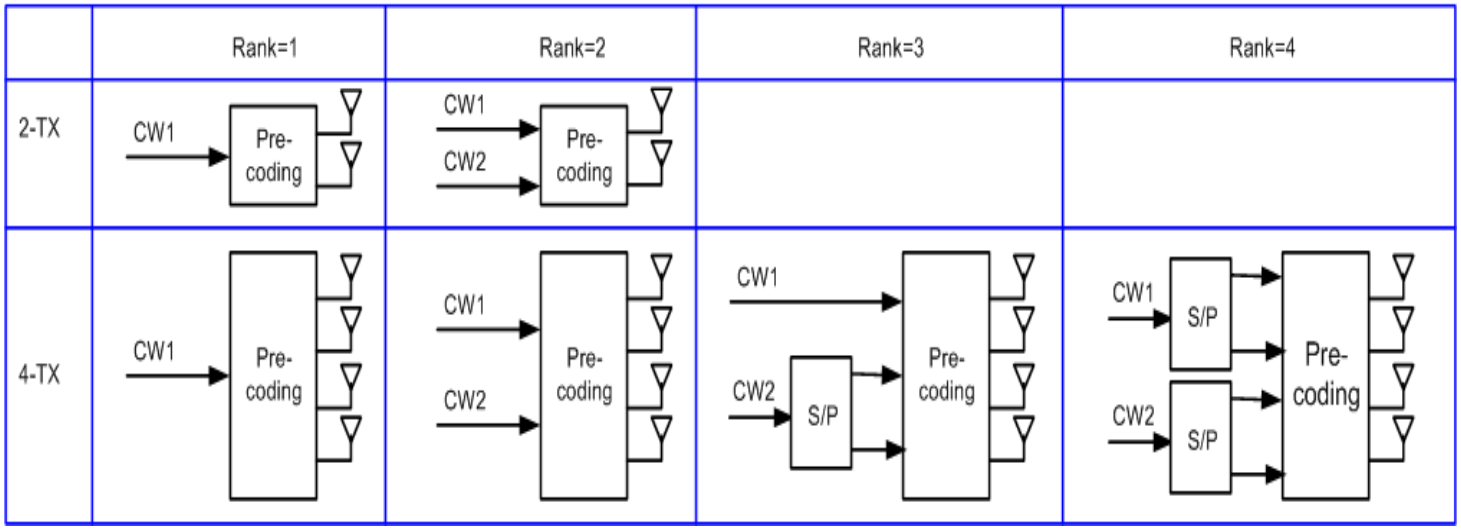
Receiver for UL MIMO

- Soft interference canceller (SIC): turbo SIC
  - Implementation flexibility: various algorithms
  - One implementation [1]: R1-083732



Number of Codewords

- Maximum number of codewords: 2
  - 2 transport blocks in a subframe
- Same codeword-to-layer mapping as in LTE downlink

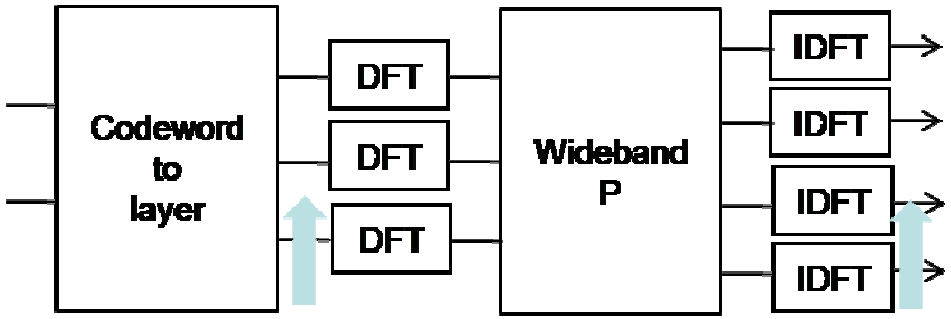


Number of codewords

- Number of MCS fields: 2
  - Separate link adapation of two codewords
- Number of HARQ indication
  - Possible candidates
    - ✓ Layer shifting on/1 HARQ indication
    - ✓ Layer shifting off/2 HARQ indication
  - Considering points
    - ✓ Performance with/without layer shifting
    - ✓ Antenna gain imbalance
    - ✓ Signaling overhead: NDI, RV etc

Number of codewords

- Layer shifting
  - Apply in the time domain: exact pattern FFS
    - ✓ Subcarrier level
    - ✓ SC-FDMA symbol level
    - ✓ Slot level
    - ✓ Codeword level
  - Possibility to configure with or without layer shifting



Precoder design

- Codebook-based precoding is supported for FDD
  - Wideband precoding per UL component carrier is supported
    - ✓ Frequency-selective precoding in a component carrier FFS
  - Size-1 codebook with identity precoding for full-rank transmission
  - Dynamic rank adaptation
  - Codebook size
    - ✓ 2 Tx: 1-layer+2-layer $\leq$ 8 (3-bit codebook)
    - ✓ 4 Tx : 1-layer+2-layer+3-layer+4-layer $\leq$ 64 (6-bit codebook)
  - Alphabet size
    - ✓ At most 8PSK alphabet { exp(j*p*n/4), n=0,1,…,7 } for non-zero elements
    - ✓ Non-8PSK but constant modulus alphabet FFS

Precoder design

- Precoding for TDD
  - Continue discussion about codebook-based vs non-codebook based approaches
  - Basically almost companies don't agree to apply to non-codebook based precoding on a baseline for TDD

Precoder design

- 2 Tx precoder
  - FFS if (1/sqrt(2)) is necessary for codebook index 4 and 5 of rank-1 case

Codebook index	Number of layers υ	
	1	2
0	$\frac{1}{\sqrt{2}}\begin{bmatrix}1\\1\end{bmatrix}$	$\frac{1}{\sqrt{2}}\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}$
1	$\frac{1}{\sqrt{2}}\begin{bmatrix}1\\-1\end{bmatrix}$	
2	$\frac{1}{\sqrt{2}}\begin{bmatrix}1\\j\end{bmatrix}$	
3	$\frac{1}{\sqrt{2}}\begin{bmatrix}1\\-j\end{bmatrix}$	-
4	$\begin{bmatrix}1\\0\end{bmatrix}$	
5	$\begin{bmatrix}0\\1\end{bmatrix}$	

Transmit diversity

- Candidates for PRACH
  - PVS
  - CDD
  - TSTD
- Candidates for PUSCH
  - 2 transmit antennas
    - ✓ FSTD
    - ✓ STBC
      - Special care of unpaired symbol due to SRS
    - ✓ Modified SFBC
    - ✓ Closed loop rank 1 precoding
  - 4 transmit antennas
    - ✓ STBC + FSTD
    - ✓ STBC + PSD
    - ✓ CDD + FSTD
    - ✓ Modified SFBC + FSTD
    - ✓ Closed loop rank 1 precoding

Transmit diversity

- Candidates for PUCCH
  - PVS
  - CDD
  - Orthogonal resource transmission (ORT) or space code transmit diversity (SCTD)

Downlink MIMO

Downlink MIMO

- The number of transmit antennas in DL: up to 8
- Design issue
  - Number of codewords
  - Reference signal (RS)
  - Transmit diversity
  - Precoding
  - Multiuser MIMO

Number of codewords

- Maximum number of codewords: 2
  - 2 transport blocks in a subframe
- Number of MCS fields: 2
  - Separate link adapation of two codewords
- Codeword-to-layer mapping
  - Up to 4 layers, reuse LTE codeword-to-layer mapping
  - Above 4 layers FFS
- Issue points
  - Layer shifting
  - Spatial HARQ bundling

Reference signal

- RS classification
  - CSI RS: channel measurement
  - DM RS: demodulation
- CQI RS
  - Transmit separately from DM RS
  - Cell specific
  - Sparse in frequency and time
- The reference signal structure can be used to support multiple LTE-Advanced features, e.g. CoMP and spatial multiplexing.

Reference signal

- DM RS
  - UE specific
  - Transmitted only in scheduled RBs and the corresponding layers:
  - Design principle is an extension of the concept of Rel-8 UE-specific RS (used for beamforming) to multiple layers
    - ✓ Details on UE-specific RS pattern, location, etc are FFS
  - RSs on different layers are mutually orthogonal
  - RS and data are subject to the same precoding operation
  - Complementary use of Rel-8 CRS by the UE is not precluded

Reference signal

- RS overhead for evaluations (normal CP)
  - CSI RS example
    - ✓ Time density: 1 symbol every 10ms per antenna port (1/140)
    - ✓ Frequency density: 1 subcarrier every 6 subcarriers per antenna port (1/6)
    - ✓ Possibility to configure the periodicity of CSI RS transmissions in terms of an integer number of subframes
  - DM RS example
    - ✓ Rank 1 transmission: 12 REs per RB (same overhead as Rel-8)
    - ✓ Rank 2 transmission: 12 REs per RB to be confirmed
    - ✓ Rank 3-8 transmissions: max 24 REs (total) per RB

Reference signal

- Allow transmissions of PDSCH to Rel-10 UEs in MBSFN (LTE-advanced) subframes
  - Possible to configure CSI RS for transmission in LTE-Advanced subframes
- Possible to use LTE-advanced features without any LTE-advanced subframes
  - Cell specific CSI RS possible to transmit in normal Rel-8 subframes.
  - Studies on CSI RS impact on PDSCH transmissions to Rel-8 UEs for various RS densities needed
    - ✓ There should be no impact from CSI RS transmission on transmission of PBCH/PSS/SSS
  - Consider implementation complexity and achievable channel estimation accuracy when considering hiding CSI RS as part of the control region
- Strive for same CSI RS and DM-RS patterns regardless of subframe type (DL Rel-8 or DL LTE-A subframes)
- DM-RS in support of up-to 8 transmission layers will need to be defined

Transmit diversity

- Issue points
  - Number of antenna ports for transmit diversity
    - ✓ RS overhead
    - ✓ Power utilization
    - ✓ Possibility of using 8 transmit diversity in PDSCH region
  - Combination of SM and transmit diversity
  - Legacy support in PDCCH region

Precoding

- Issue points
  - Codebook based or non-codebook based
  - New antenna set-up (i.e, dual-polarized antenna array)
  - Feedback from UE
    - ✓ PMI based
    - ✓ Other mechanism

Multiuser MIMO

- Enhancement of Rel-8 multiuser MIMO
  - Indication of interfering PMI
    - ✓ How many interferers need to be indicated
  - Increased granularity of transmit power level indication
  - More than 1 streams for a scheduled UE
  - UE feedback

Cooperative multiple points TX/RX (CoMP)

Terminology

- Coordinated multi-point transmission/reception
  - Improving the coverage of high data rates, the cell-edge throughput and/or to increase system throughput.
- Serving cell: cell transmitting PDCCH assignments (a single cell)
- CoMP cooperating Set
  - Set of (geographically separated) points directly or indirectly participating in PDSCH transmission to UE.
    - ✓ Note that this set may or need not be transparent to the UE.
  - CoMP transmission point(s): point or set of points actively transmitting PDSCH to UE
    - ✓ CoMP transmission point(s) is a subset of the CoMP cooperating set
    - ✓ For Joint transmission, the CoMP transmission points are the points in the CoMP cooperating set
    - ✓ For Dynamic cell selection, a single point is the transmission point at every subframe. This transmission point can change dynamically within the CoMP cooperating set.
    - ✓ For Coordinated scheduling/beamforming, the CoMP transmission point corresponds to the “serving cell”

Terminology

- CoMP reporting set: set of cells about which channel state/statistical information related to their link to the UE is reported
  - The CoMP reporting set may be the same as the CoMP cooperating set
  - The actual UE reports may down-select cells for which actual feedback information is transmitted
- Measurement set: in support of RRM measurements (already in Rel-8) and therefore not CoMP specific

CoMP category

- Downlink CoMP
  - Dynamic coordination among multiple geographically separated transmission points.
  - CS (Coordinated Scheduling and/or beam-forming)
    - ✓ Data is only available at serving cell (data transmission from that point) but user scheduling/beamforming decisions are made with coordination among cells corresponding to the CoMP cooperating set
  - JP (Joint processing/transmission)
    - ✓ Data is available at each point in CoMP cooperating set
      - Joint Transmission: PDSCH transmission from multiple points (part of or entire CoMP cooperating set) at a time
      - Dynamic cell selection: PDSCH transmission from one point at a time (within CoMP cooperating set)

CoMP performance evaluation

- Evaluation environments detail should be provided
  - CoMP scheduler
  - Feedback assumption and impairment modeling
  - Backhaul assumption
  - Time/frequency synchronization assumption
  - Transmission mode
    - ✓ MU-MIMO and/or SU-MIMO operation in conjunction with CoMP
  - CoMP set maintenance
  - Geometry CDF for CoMP UE and non CoMP UE

CoMP feedback

- Feedback category
  - Explicit channel state/statistical information feedback
    - ✓ Channel as observed by the receiver, without assuming any transmission or receiver processing
    - ✓ Channel as observed by the receiver, assuming recommended transmission or receiver processing
  - Implicit channel state/statistical information feedback
    - ✓ Recommended transmission properties (e.g. CQI/PMI/RI)
  - UE transmission of SRS can be used for CSI estimation at eNB exploiting channel reciprocity

CoMP feedback

- Considerations
  - Continue looking at these types of feedback mechanisms for the evaluations.
  - We need to gradually identify the UL overhead (number of bits) associated with each specific feedback mechanism.
  - The feedback overhead (UL) vs, DL performance tradeoff should be assessed with the goal to target minimum overhead for a given performance

CoMP feedback

- Feedback reports
  - UE CoMP feedback reports target the serving cell (on UL resources from serving cell) as baseline, when X2 interface is available and is adequate for CoMP operation in terms of latency and capacity
    - ✓ In this case, the reception of UE reports at cells other than the serving cell is a network implementation choice.
    - ✓ The feedback reporting for cases with X2 interface not available or not adequate (latency and capacity), and for cases where feedback reports to the serving cell causes large interference (e.g., in heterogeneous deployment scenarios) → further discussion/solution
  - Two possibilities
    - ✓ Expand the supported PUCCH payload sizes
    - ✓ Use periodic/aperiodic reports on PUSCH

Relaying functionality

Overview

- Relaying
  - As a tool to improve e.g. the coverage of high data rates, group mobility, temporary network deployment, the cell-edge throughput and/or to provide coverage in new areas.
- Relay Functionalities
  - Wirelessly connected to radio-access network via a donor cell.
- Connection type
  - Inband
    - ✓ Network-to-relay link share the same band with direct network-to-UE links
    - ✓ Rel'8 UE should be able to connect donor cell
  - Outband
    - ✓ Network-to-relay link does not operate in the same band
- Relay classification w.r.t the knowledge in the UE
    - ✓ Transparent
    - ✓ Non-transparent
  - Depending on the relaying strategy, a relay may
    - ✓ Part of the donor cell or control cells of its own (similar to eNB)

Overview

- Relay classification w.r.t the knowledge in the UE
  - Transparent
    - ✓ UE is not aware of whether or not it communicates with the network via the relay
  - Non-transparent
    - ✓ UE is aware of whether or not it is communicating with the network via the relay
- Depending on the relaying strategy
  - Part of the donor cell
    - ✓ No cell ID
    - ✓ A part of RRM functionality
    - ✓ Support Rel'8 UE
    - ✓ Smart repeater, DF relay, etc
  - Control cells of its own (similar to eNB)
    - ✓ Unique cell ID
    - ✓ No difference from eNode B from UE perspective
    - ✓ L3 relay and type I relay

Type I relay

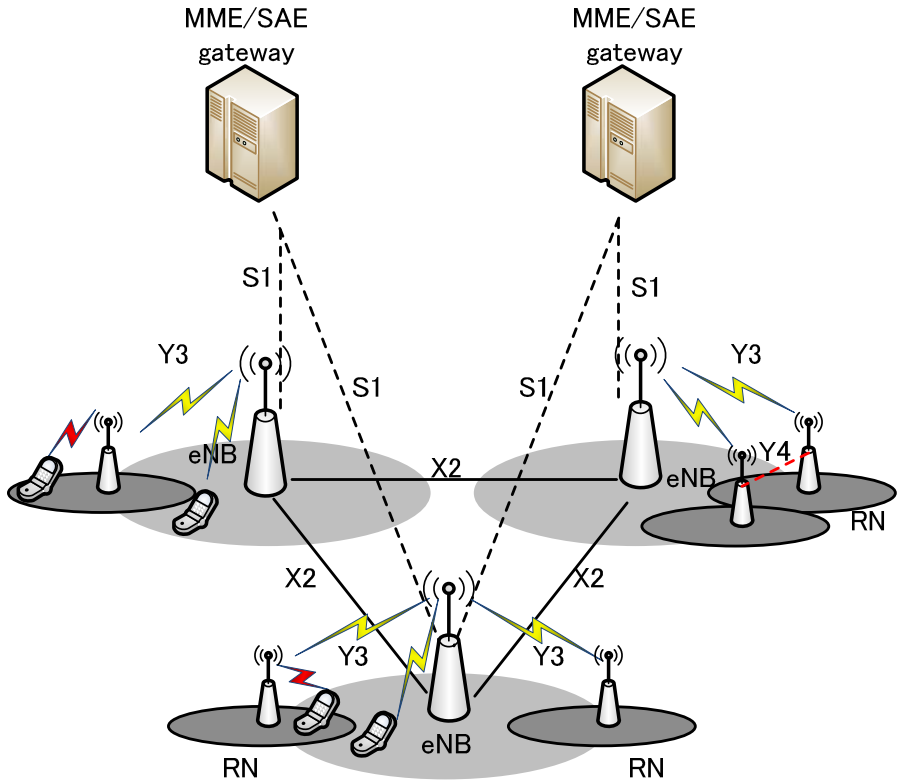
- Inband relay
- As a separate cell distinct from donor cell
- The cells shall have its own physical cell ID (defined in LTE Rel-8)
- Relay node shall transmit its own SCH and reference symbols
- UE shall receive scheduling information and HARQ feedback directly from the relay node and send its control channels (SR/CQI/ACK) to the relay node
- It shall appear as a Rel-8 eNodeB to Rel-8 UEs
- To LTE-Advanced UEs, it should be possible for a type 1 relay node to appear differently than Rel-8 eNodeB to allow for further performance enhancement.

Type II relay

- No separate cell ID
- Relay to/from Rel'8 UEs
- Rel'8 UE should not be aware of the presence of a type II relay
  - Transparency also for release >8 UEs is preferred
- Aspects that need to be studied
  - Performance benefits
  - Specification impact
  - Etc

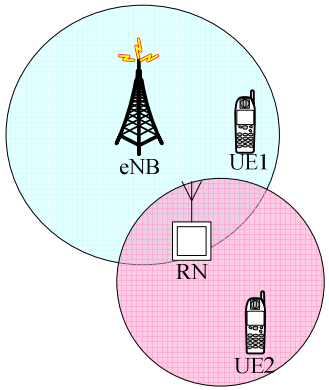
LTE-A RN architecture

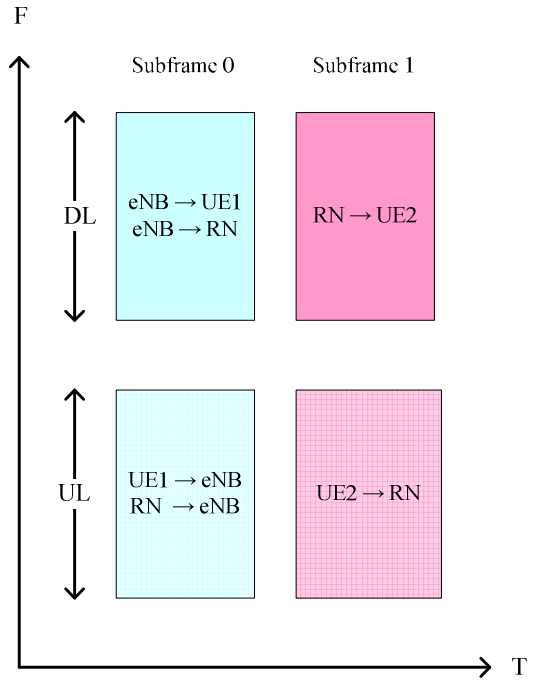
- An example of LTE-A architecture using Relay Nodes
  - e.g. Y3(eNB-RN), Y4(RN-RN) interface

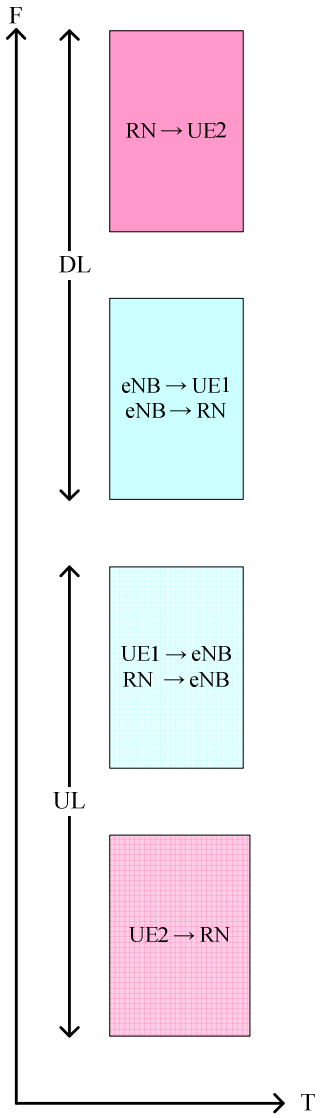


TD relay vs. FD relay for FDD system

- TD relay vs. FD relay for FDD system





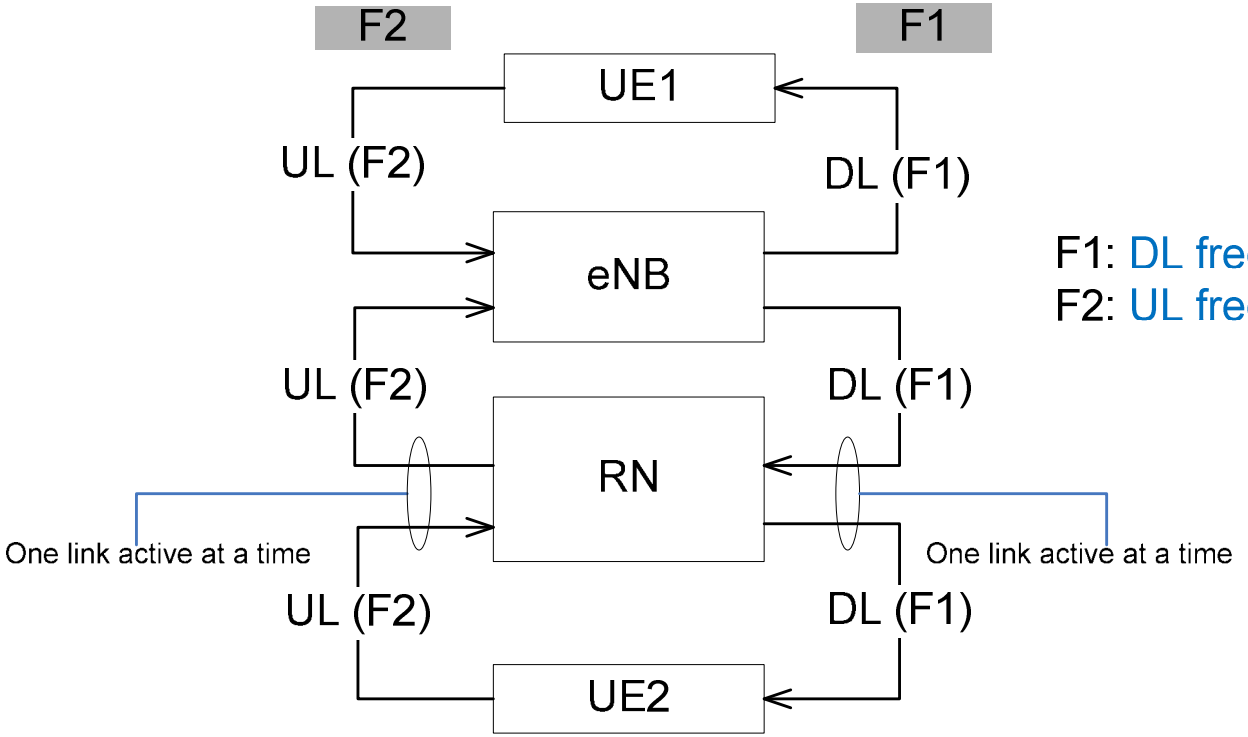


Access-Backhaul partitioning

- Backhaul design supported for FDD
  - TDM access-backhaul
  - Access split
    - ✓ eNB → RN is in DL frequency
    - ✓ RN → eNB is in UL frequency
    - ✓ eNB → RN and RN → UE links are TDM (only one active at a time)
    - ✓ RN → eNB and UE → RN links are TDM (only one active at a time)
- Access-backhaul for TDD is FFS
- Support of backhaul using UL resources for eNB → RN communication FFS
  - Possibly allowing shifting of DL and UL resources to eNB →RN or RN →eNB links for DL/UL backhaul capacity enhancement

Access-backhaul partitioning

- Illustration



F1: DL frequency (FDD)
F2: UL frequency (FDD)

References

- ITU-R M.2134, “Requirements related to technical performance for IMT-Advanced radio interface(s)”
- 3GPP TR 36.814 v1.0.0, “Further Advancements for E-UTRA Physical Layer Aspects(Release 9)”
- 3GPP TS 36.211 v8.6.0,” Evolved Universal Terrestrial Radio Access (E-UTRA);Physical Channels and Modulation(Release 8)”
- TS 36.212 v8.6.0,” Evolved Universal Terrestrial Radio Access (E-UTRA);Multiplexing and channel coding(Release 8)”
- TS 36.213 v8.6.0,” Evolved Universal Terrestrial Radio Access (E-UTRA);Physical layer procedures(Release 8)”

Thank you !