THE NEED FOR ADDITIONAL BROADCAST CAPACITY

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BACKGROUND

- The broadcast channel has a fixed capacity, and the concern of increased system information has been discussed at several occasions in the past:
  - REL-8 Common E-DCH
  - REL-11 Further enhancements to CELL_FACH
- The BCH load depends on:
  - The number of supported features
  - The amount of information broadcasted (e.g. neighboring cell information, explicit resource configuration)
  - Scheduling/configuration (SIB repetition period, segmentation/concatenation, …)
- Fixed BCH capacity + increased system information => longer SI acquisition latency for the UE
- Longer SI acquisition negatively impacts:
  - CS fallback from LTE
  - Cell Reselection
  - RRC state switch from CELL_DCH to CELL_FACH or CELL_PCH/URA_PCH
  - Call re-establishment
  - RRC Connection Reject/Release with redirection
- SIB repetition period cannot be increased indefinitely (practical limit 1.28 sec)
- Increased SIB size increases SIB acquisition latency:
  - UE needs to receive consecutive segments successfully in order
  - SIB may contain up to 16 segments (e.g. SIB11)

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BCH STUDY: TR 25.704 (1)

- The need for additional BCH capacity has been studied:
  - Currently deployed networks do not experience problems:
    - Because supported features are up to REL-8
    - Neighbour cell information is increasing (introduction of SIB11bis) and has a relatively high impact
  - Expected BCH load in REL-11:
    - Different views (i.e. different NW deployments), but results are not that far apart:

Reference scenario A

IE(s)	Rep- Period	Octets	Segments	#Seg/ 1.28 sec	Percentage
MIB + SIB7	80 ms	20.5 + 2.5	1	16	24%
SB1	320 ms	54	2	8	12%
SIB1 + SIB2	640 ms	16.5 + 8.5	1	2	3%
SIB3 + SIB21	640 ms	23 + 3	1	2	3%
SIB5 + SIB18	640 ms	124 + 14	5	10	15%
SIB11	1280 ms	386	14	14	21%
SIB11bis + SIB12	1280 ms	208 + 12	8	8	12%
SIB19	640 ms	43	2	4	6%
SIB22 + SIB4	640 ms	36	2	4	6%
				68 (106% load)	

Reference scenario B

IE(s)	Rep- Period	Octets	Segments	#Seg/ 1.28 sec	Percentage
MIB + SIB7	80 ms	21 + 3	1	16	27.6%
SB1	320 ms	49	2	8	13.8%
SIB1 + SIB2	640 ms	18 + 3	1	2	3.4%
SIB3 + SIBx	640 ms	18 + 8	1	2	3.4%
SIB5	640 ms	135	5	10	17.2%
SIB11	1280 ms	436	16	16	27.6%
SIB4 + SIB19	640 ms	12 + 14	1	2	3.4%
SIB22+SIB21	640 ms	16 + 3	1	2	3.4%
SIBx = SIB12	1280ms	8	0	0	0%
SIBx = SIB18	1280ms	8	0	0	0%
				58 (90% load)	

BCH STUDY: TR 25.704 (2)

- Conclusions TR 25.704:
  - The BCH load depends on different factors, such as SIB configuration, the number of supported features, and the amount of information broadcasted. Analysis shows that proper way of concatenation and segmentation could also improve usage of the available BCH capacity significantly.
  - Typically, current networks with some features up to and including Release 8 do not experience BCH load issues.
  - Some analysis shows that the BCH capacity can already be exceeded in REL-11 (106%), where other analysis estimates a 90% load for REL-11.
  - At this point in time REL-12 features are still being discussed, and stage 3 details have not been agreed. In case the neighbor cell information is increased then this may have a potentially high impact on the BCH load:
    - Except in case the number of inter-frequency and/or intra-frequency neighbour cells in Idle mode is increased (discussed in RAN2 “Heterogeneous Networks” and RAN4 Work Item on “Increasing the minimum number of carriers for UE monitoring in UTRA and E-UTRA”). This may have a high impact on the BCH load (assumed to scale with the increased number of neighbours)

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