Proposal 2.2.5 after 4th round discussion:

For multiplexing a HP HARQ-ACK and a LP HARQ-ACK into a PUCCH in R17, select a coding scheme for total number of LP and HP HARQ-ACK bits >2 [and select a sequence-transmission scheme for total number of LP and HP HARQ-ACK bits =2] based on simulation results and analysis following the criteria:

* The link performance of HP and LP HARQ-ACK is guaranteed after multiplexing, i.e. the scheme which achieves the following performance requirements for multiplexed HP and LP UCI with a smaller SNR is desired.
	+ Performance requirements for HP HARQ-ACK
		- 10^-4 or 10^-5 bit error rate
		- [10^-2 false alarm rate (encouraged to provide)]
		- [10^-3 undetectable error rate (for >2 bits HARQ-ACK) (encouraged to provide)]
	+ Performance requirements for LP HARQ-ACK
		- 10^-2 or 10^-3 bit error rate
		- [10^-2 false alarm rate (encouraged to provide)]
		- [10^-2 undetectable error rate (for >2 bits HARQ-ACK) (encouraged to provide)]
	+ Channel: TDL-A 30ns, TDL-C 300ns
	+ For total number of LP and HP HARQ-ACK bits >2, the following combinations are considered:

|  |  |
| --- | --- |
| HP HARQ-ACK | LP HARQ-ACK |
| 1 bit | 8 bits |
| 4 bits | 16 bits |
| 10 bits | 10 bits |
| 8 bits | 48 bits |

* + The baseline is to treat both LP and HP HARQ-ACK bits as HARQ-ACK bits with HP priority and reuse R15 UCI multiplexing scheme.
* Resource efficiency.
* PUCCH multi-user multiplexing capacity.
* Impact to DL PDSCH throughput if compression/bundling/Partial dropping for LP HARQ-ACK if considered.
* The reliability of the LP HARQ-ACK codebook size determination.
* Specification impacts.
* UE and gNB implementation complexity.

[Note 1: false alarm rate is the probability that DTX is detected as a correct payload.

Note 2: undetectable error rate = # instances that a UCI payload is declared as correct when the UCI payload is in error / Total # instances that UCI payloads are in error, where a UCI payload is declared as correct if it passes the error detection check (with details up to each company, and to be reported).]