

[OFDMA Downlink – Evaluation of channel estimation performance under mobile conditions]

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Problem Statement

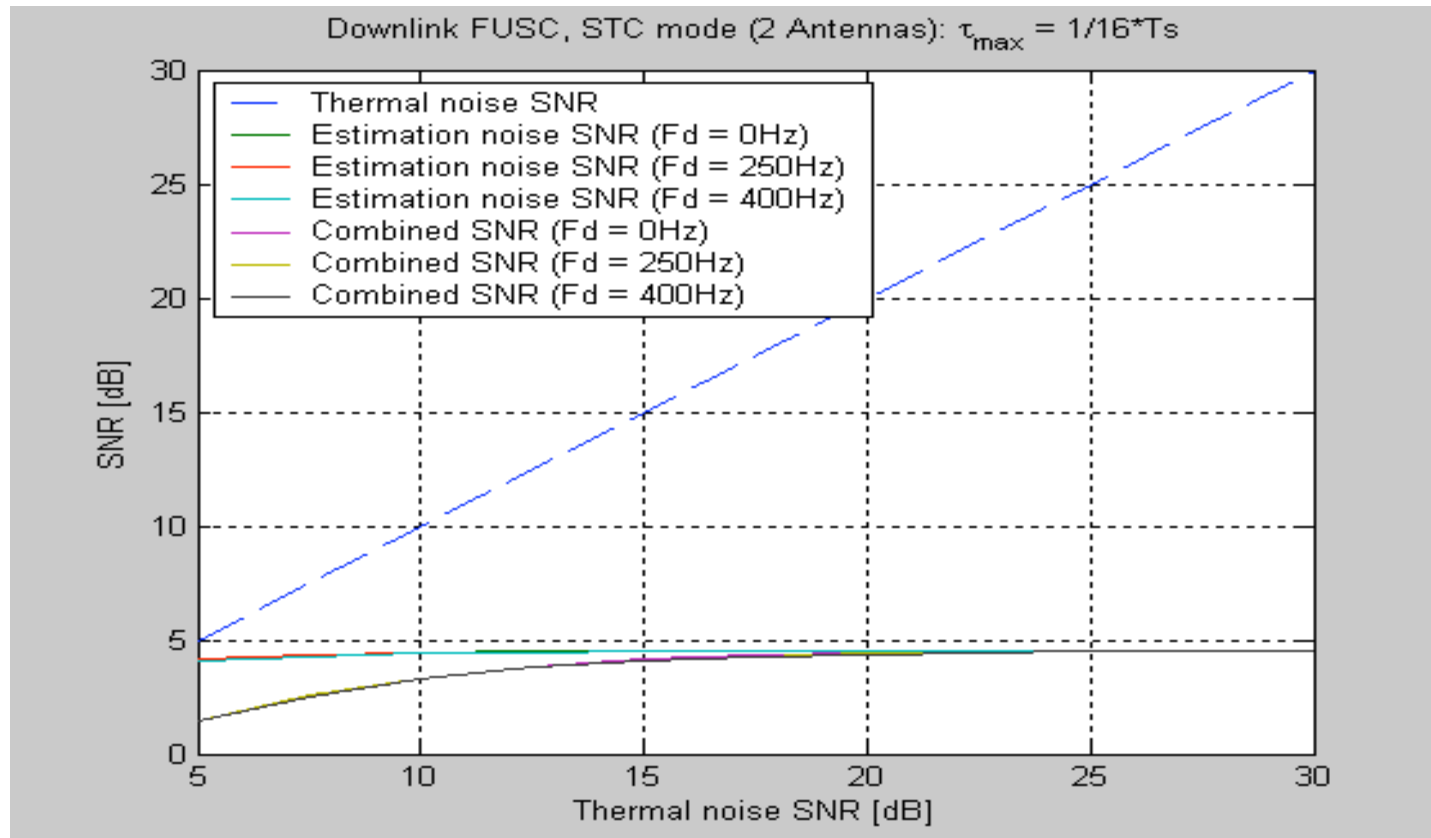
- Scattered pilots are required for channel estimation in mobile environments.
- Current pilot arrangement does not enable reliable channel estimation in STC mode with high multi-path channels since pilots are too far apart.
- As a result, channel estimation - and not ISI - will be the limiting factor when combating multi-path.
- In addition, pilot location does not change between cells.

FUSC zone

- Current definition:
 - Non-STC mode: Pilots are spaced 6 subcarriers apart over a 2 symbol cycle.
 - STC mode: Pilots are spaced 12 subcarriers apart of the symbol cycle.

FUSC: Current Performance of STC mode

- MMSE estimation from pilots
- subcarrier spacing=11KHz



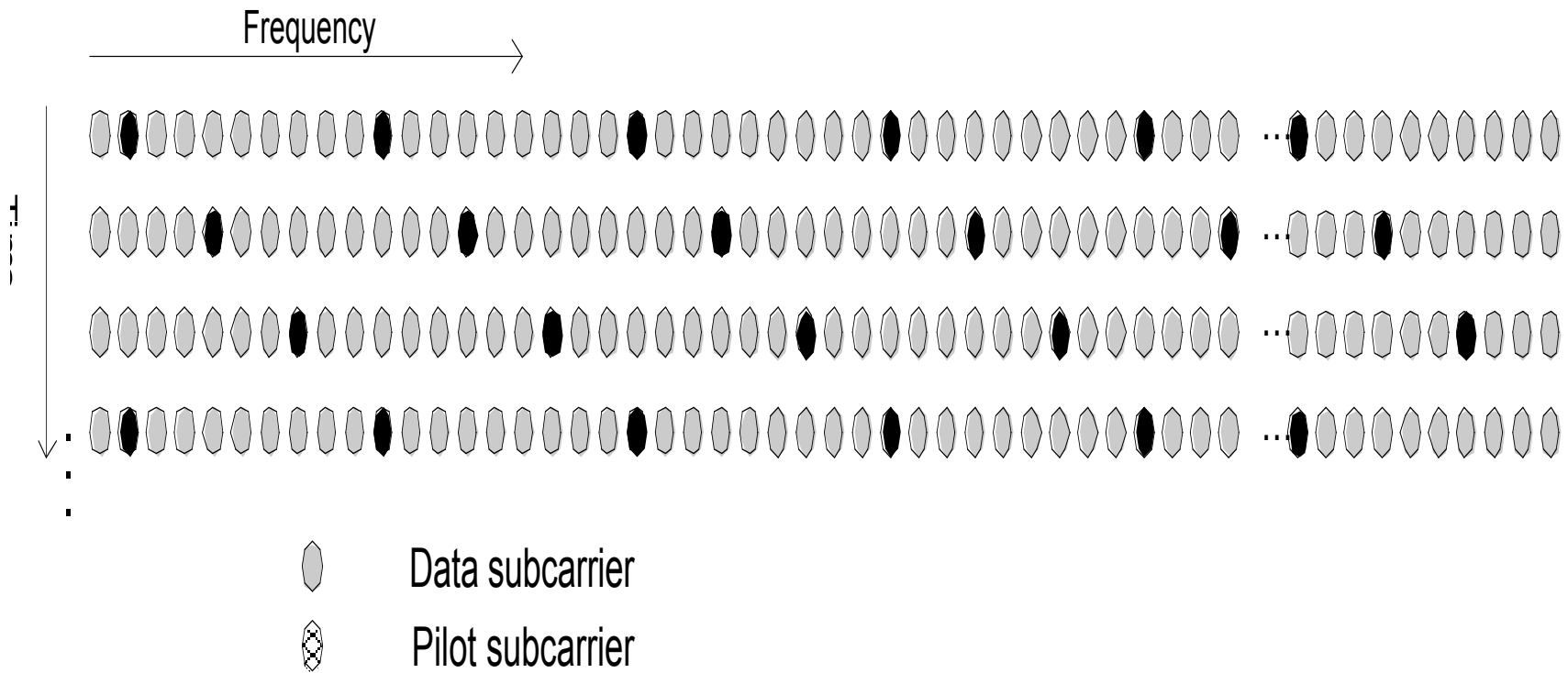
FUSC: Proposed Solution

(Contribution #238)

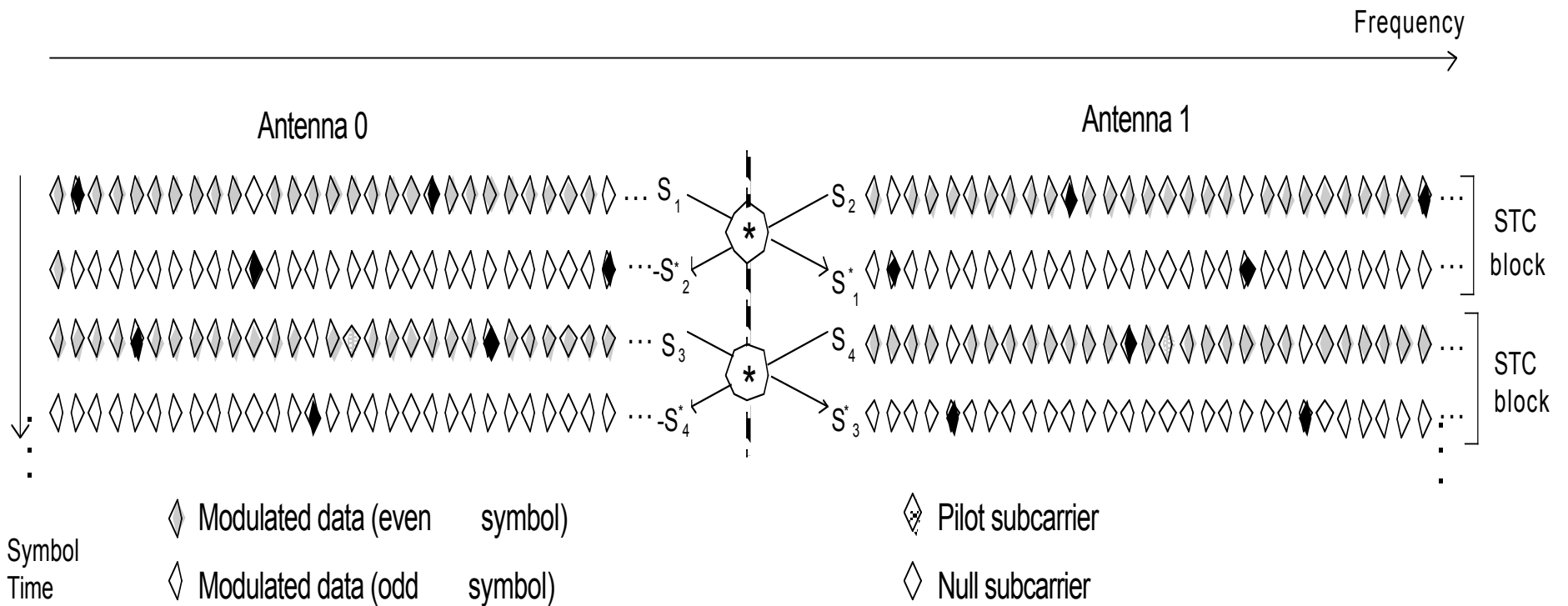
- Adopt pilot locations of 'Optional FUSC' mode, i.e. pilot spacing of 3 subcarriers over a cycle of 3 symbols.
- Define two basic pilot sets:
 - PilotSet#0 = $18k+3m+1$
 - PilotSet#1 = $18k+3m+10$
- Where:
 - $k = 0, 1, \dots, N_{pilots}-1$
 - $m = ((\text{floor}(FUSC_SymbolNumber/KSTC)+IDCell) \bmod 3)$
 - $KSTC = 1/2/4$ for the non-STC / 2-Antenna / 4-antenna cases, respectively.

non-STC mode

- Use both pilot sets in each symbol:



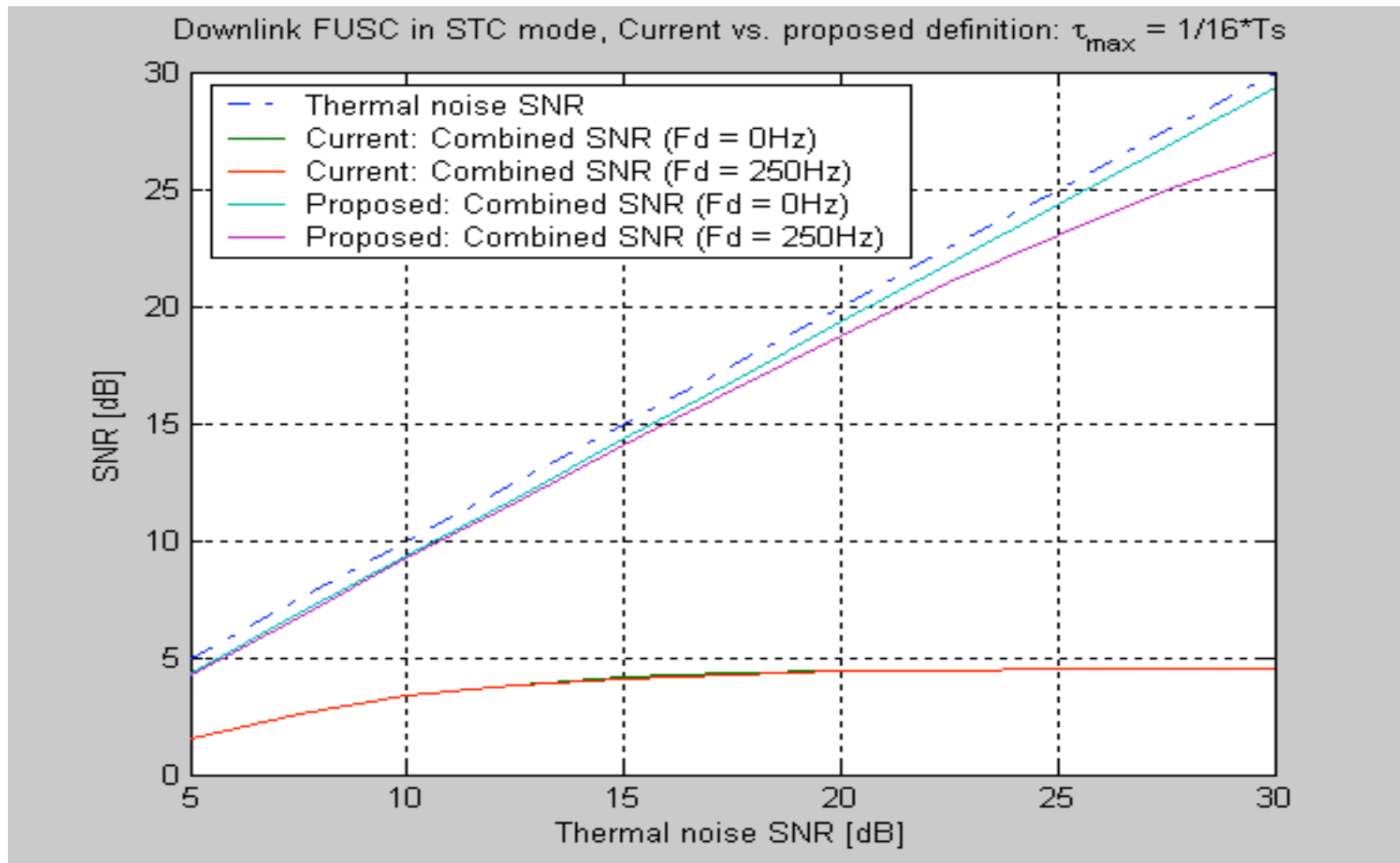
2-Antenna STC mode



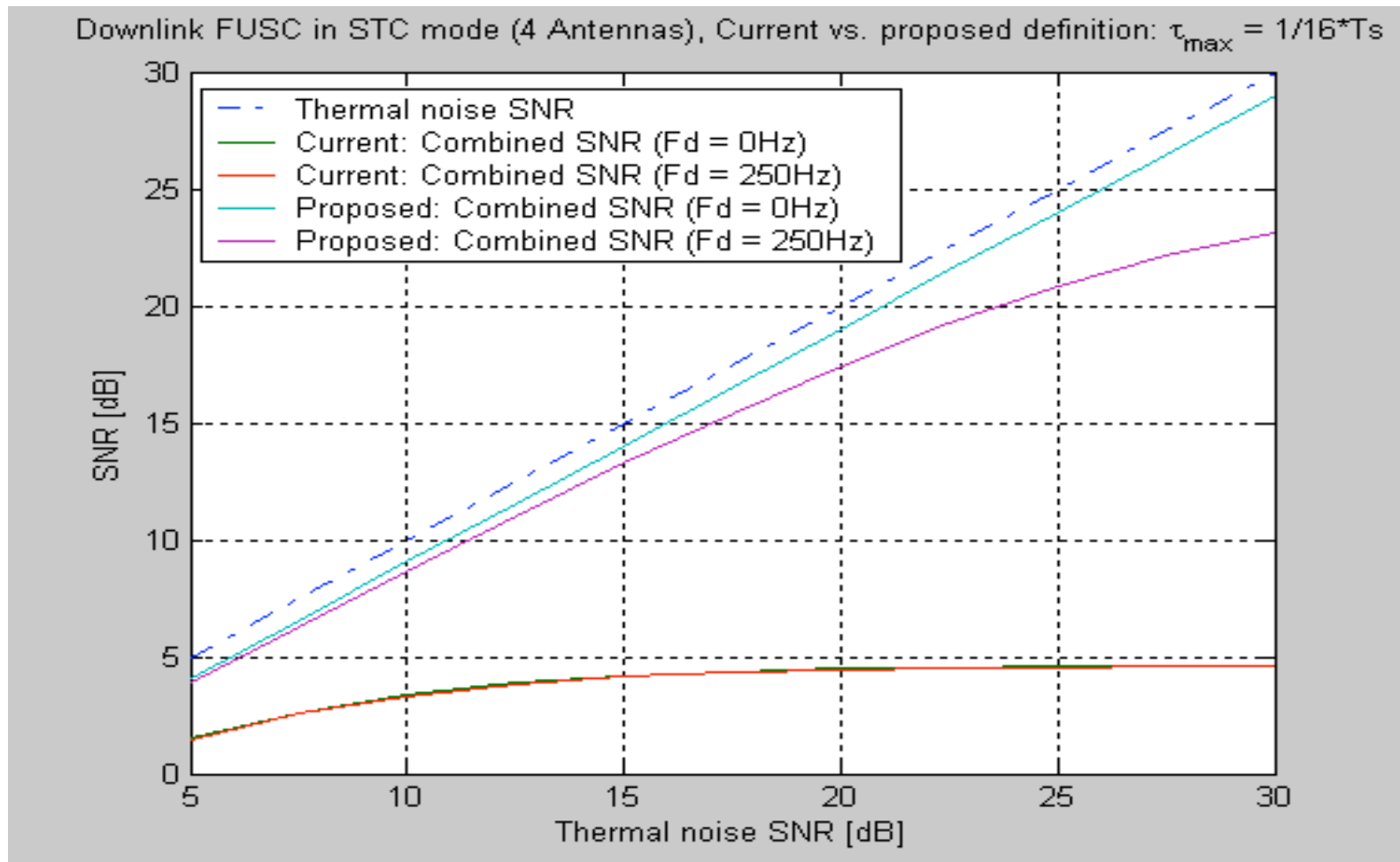
4-Antenna STC mode

- Symbol #0:
 - PilotSet#0 for antenna #0 and PilotSet#1 for antenna #1.
- Symbol #1:
 - PilotSet#0 for antenna #2 and PilotSet#1 for antenna #3.
- Symbol #2:
 - PilotSet#1 for antenna #0 and PilotSet#0 for antenna #1.
- Symbol #3:
 - PilotSet#1 for antenna #2 and PilotSet#0 for antenna #3.

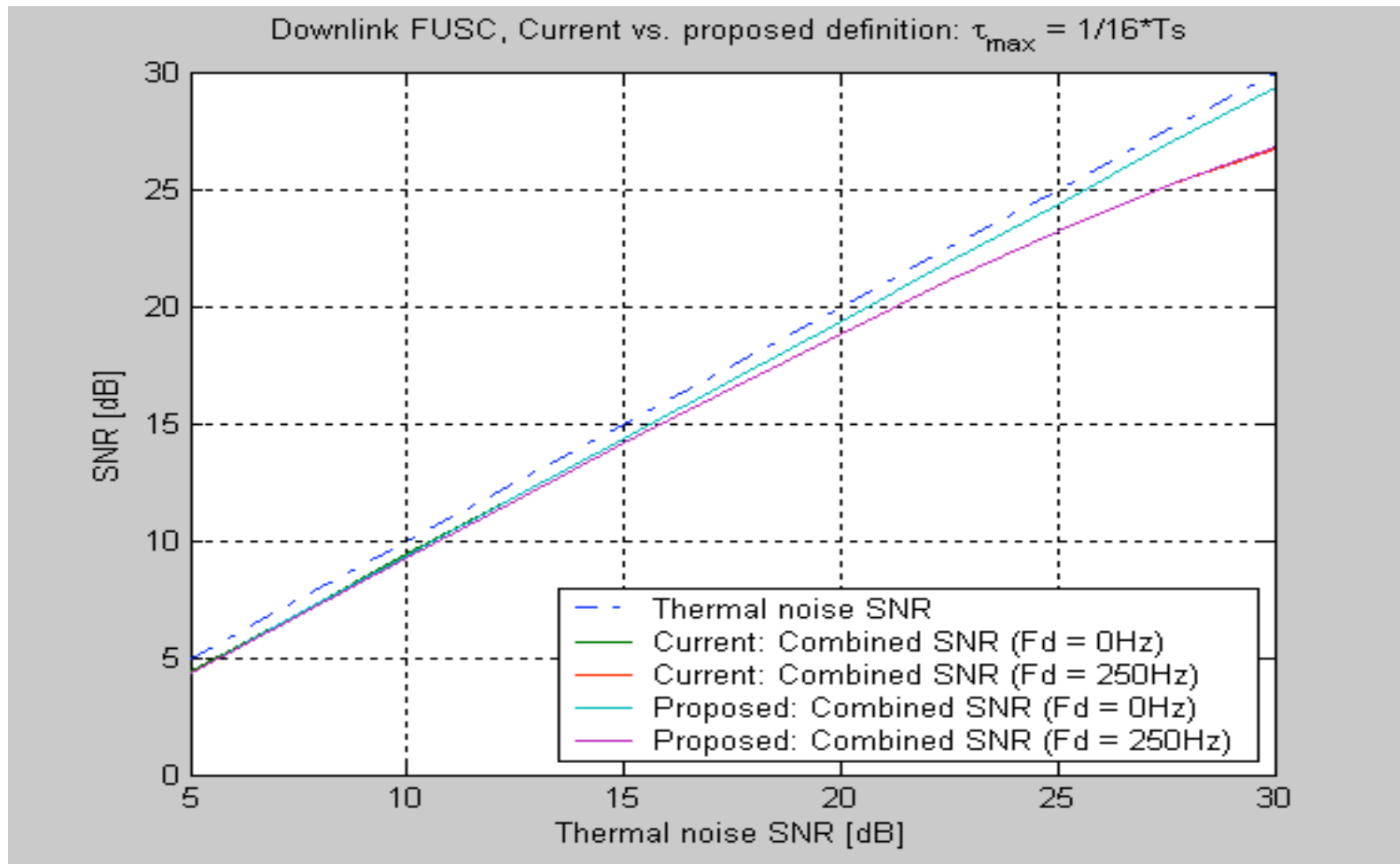
Performance Comparison: 2-Antenna mode



Performance Comparison: 4-Antenna mode



Performance Comparison: non-STC mode



FUSC zone

[Text Changes]

PUSC zone

- In STC mode for the PUSC zone, pilots are spaced 12 subcarriers apart. This spacing is not adequate in cases of high multi-path.
- In addition, STC encoding is performed over symbol-pairs rather than symbols. This will degrade performance in situations where high Doppler spread is present.

PUSC: Current Performance of STC mode

