

Performance Evaluation and Comparison for Primary Fast Feedback Channels

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Performance Evaluation and Comparison for Primary Fast Feedback Channels

March, 2009

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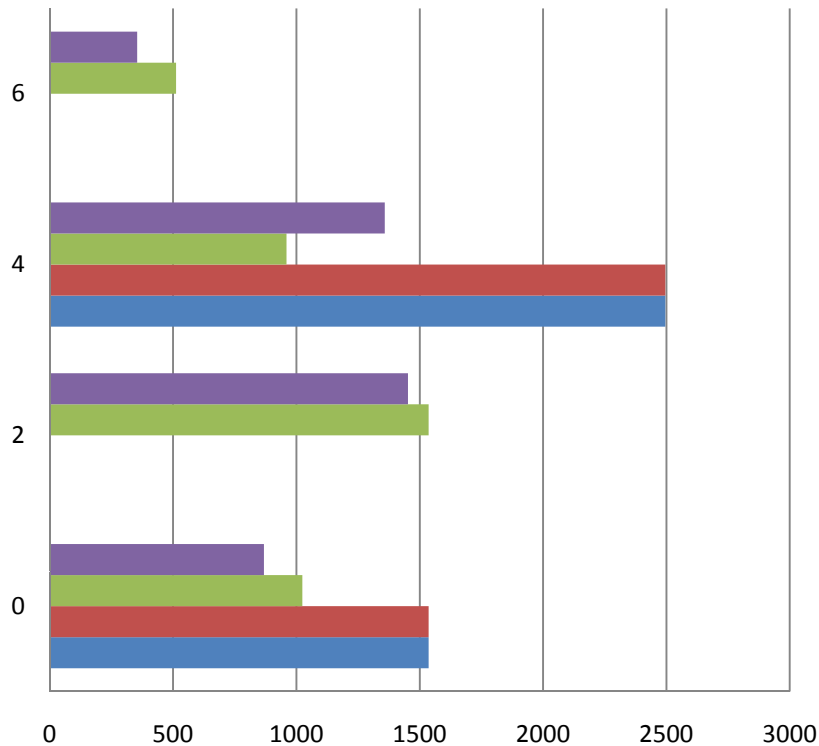
Introduction

- **Sequence Evaluation**
 - Several sequences are proposed for modulating Primary Fast Feedback Channel
 - Refer to UL Control DG Non-harmonized text (C80216m-09_0387r1)

- **Performance Comparison**
 - Sequence correlation property
 - Simulation results in various channel conditions

Sequence Characteristics

Cross-correlation Test (6bits)



	0	2	4	6
ITRI	868	1452	1358	354
LGE	1024	1536	960	512
Intel	1536	0	2496	0
Samsung	1536	0	2496	0

- **Correlation Property**

- Distribution of correlator outputs

$$\rho_{p,q} = \left| \sum_{k=0}^{11} C_p[k] C_q^*[k] \right|$$

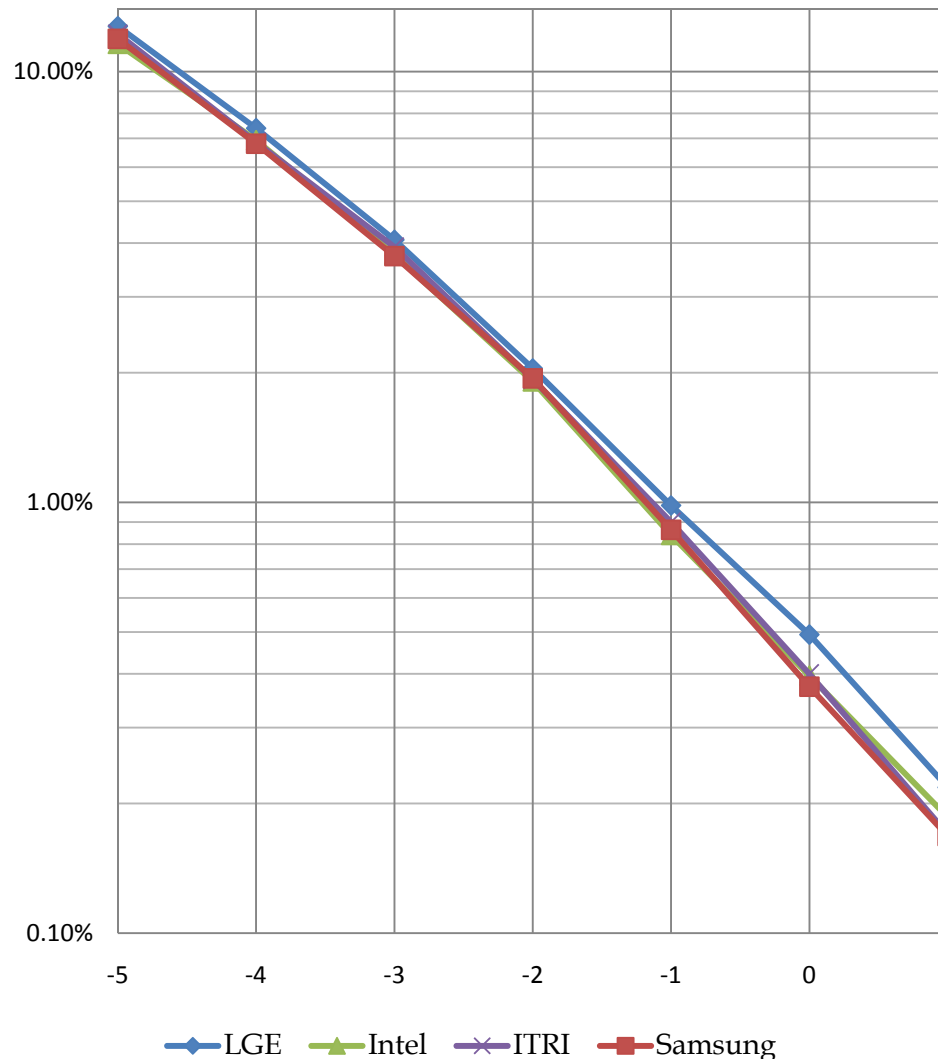
- Ideal condition is when all correlations are same,

- **Correlation Comparison**

- Correlation of Samsung's and Intel's are 0 or 4,
- Correlation of ITRI's and LGE's have the values of 0, 2, 4, 6

Detection Performance in Ped. B 3km/h

Ped. B 3km/h (6bits)

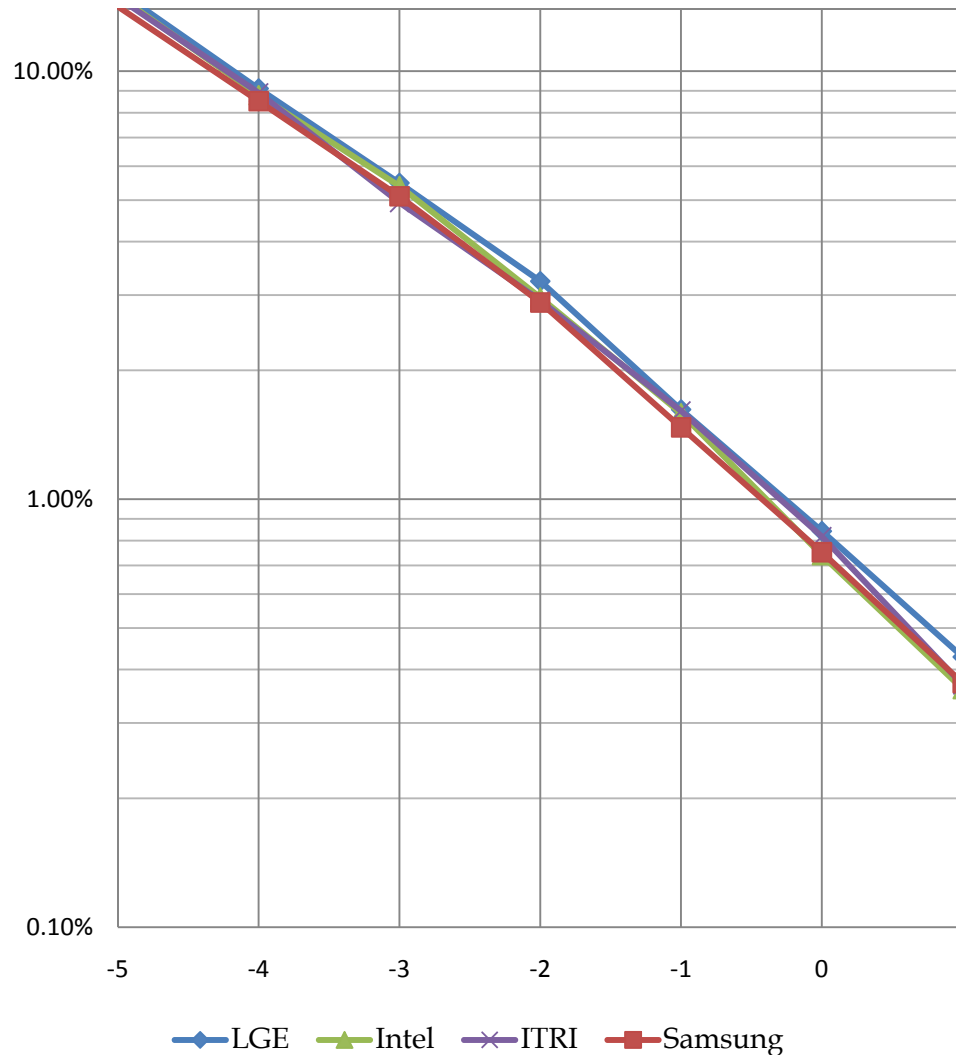


Analytic Remarks

- LGE's sequence is slightly worse than others
- Intel, ITRI, Samsung's have almost same performance
- Performance gap is about 0.2dB @ 1% PER

Detection Performance in Veh. A 120km/h

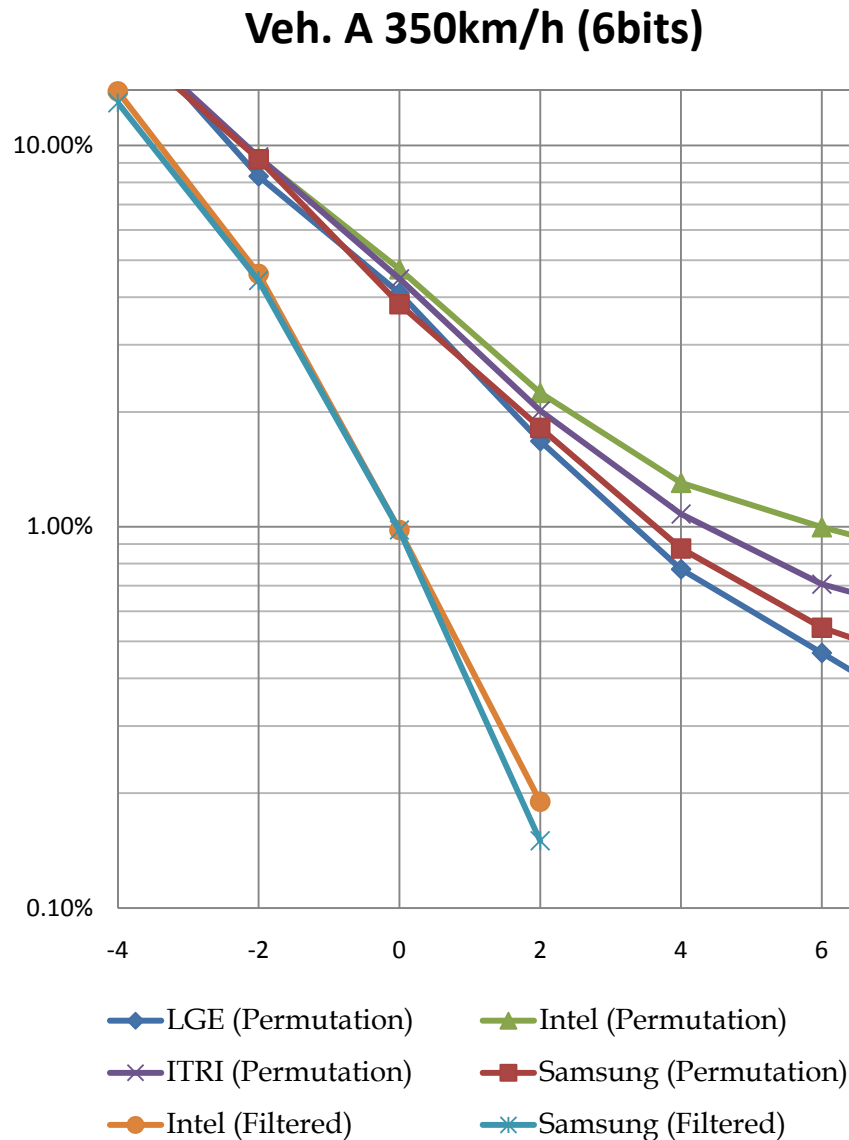
Veh. A 120km/h (6bits)



Analytic Remarks

- LGE's and ITRI's sequences are slightly worse than others
- Intel's and Samsung's have almost same performance
- Performance gap is about 0.1~0.2dB @ 1% PER

Detection Performance in Veh. A 350km/h



Analytic Remarks

- With correlator receivers, the better performance is obtained by (LGE > Samsung > ITRI > Intel)
- Performance gap is about 0.3dB ~ 1.6dB @ 1% PER
- Some advanced receivers can significantly improve high speed detection performance

Summary

- **Correlation Property**
 - Samsung's and Intel's sequence have better correlation property than others (Maximum correlation is limited by 4)
- **In relatively slow fading conditions,**
 - Samsung's = Intel's > ITRI's > LGE's
 - Performance SHALL be optimized in these conditions,
- **In an extremely fast fading condition,**
 - Samsung's is the best among ones having the same performance in slow fading
- **Suggestion : to Adopt Samsung's Sequence as Primary FBCH sequence**
 - Proposed text is provided in C80216m-09/

Appendix#1

Simulation Environments

Parameters	Values
Sampling rate	11.2MHz
Carrier frequency	2.3GHz
Feedback tile structure	(2 by 6)
Antenna configuration	1Tx + 2Rx
Detector	Correlator-based MLD (MLD with Wiener filtering are optionally used for Veh. A 350km/h)
Sequence mapping	Permutation in C80216m-09_0387r1 Tile#1 {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11} Tile#2 {9, 10, 11, 3, 4, 5, 0, 1, 2, 6, 7, 8} Tile#3 {3, 4, 5, 6, 7, 8, 9, 10, 11, 0, 1, 2}