TSG-RAN Working Group 1 meeting #2
Shin-Yokohama, February 22-25, 1999

TSGR1#2(99)074

Agenda item: **8.10**

Source: **Ad Hoc #1**

Title: **Report from Ad Hoc #1: TDD**

Document for:

1 Introduction

Based on the agreement in the 1st WG1 meeting, the temporary Ad Hoc #1 on TDD was established to accelerate the merging process. This document summarises the commonalties and differences between ARIB-TDD and UTRA-TDD and gives a proposal for merging as identified in the email discussion in Ad Hoc #1 and in the physical meeting held on February 22, 1999, 9:30 – 12:45 hours.

2 Background information

Within ETSI, detailed discussions on TDD have taken place since spring 1998. In order to be able to recapitulate the history and the most important items of these discussions, useful reference documents in addition to the ETSI XX.docs and ARIB Vol.3 are the following:

(1) List of agreed working assumptions for UTRA TDD in TDoc SMG2 L1 590/98 by SMG2 UMTS L1

(2) UTRA TDD basic working assumptions in TDoc SMG2 L1 551/98 by Panasonic and Siemens

(3) A way forward for the TDD mode in TDoc SMG2 L1 507/98 by France Telecom, T-Mobil, Mannesmann Mobilfunk, Vodafone, Alcatel

(4) UTRA TDD harmonisation proposal in TDoc SMG2 L1 305/98 by Siemens

(5) Open issues on Tdoc 305 in TDoc L1 387/98 by Panasonic

(6) Answers to Open Issues from SMG2 L1 TDoc 387/98 in TDoc L1 425/98 by Siemens

3 Commonalties and differences and proposal for merging

This section gives a list of the commonalties and differences between ARIB-TDD and ETSI-TDD. This list is based on the one presented in TSGW1#1(99)004, “On 3GPP TDD mode”, by Panasonic with slight changes. An explanatory column is introduced in which it is noted if the respective item is related to one of the ETSI basic working assumptions as given in the document (1) mentioned above. In addition, a recommendation is given on how to proceed for those items where there is a difference between ARIB-TDD and UTRA-TDD.

	ARIB-TDD	**UTRA-TDD (ETSI)**	**difference?**	**Recommendation in case of difference**
Multiple Access	TDMA/CDMA	TDMA/CDMA	-; ETSI basic WA (working assumption)	
Chip Rate	4.096 Mcps, (1.024, 8.192, 16.384 Mcps)	4.096 Mcps	difference, same as FDD	take ARIB, chip rates in brackets FFS
Carrier Spacing	Flexible with 200kHz carrier raster	Flexible with 200kHz carrier raster	-	
Inter BS Sync.	Synchronous	Synchronous	-	
Cell Search Scheme	3 step code acquisition based on non-scrambled symbols, 8 DL slots used, no tgap, no toff	primary and secondary synchronisation, two step approach, predefined codes of length 256 chips, 2 DL time slots used, tgap, toff	Difference	length 256 primary synchr. sequence, length 256 secondary synchr. sequences, spreading factor less or equal to 16, tgap, toff; FFS: pointing from secondary synchronisation sequence to CCCH slot and in which and how many time slots to send SCH and CCCH
Frame Length	10 ms (16 slots)	10 ms (16 slots)	-	
VSF (spreading code)	1-512	1-16[1]	difference; ETSI basic WA	take ETSI
Intra-frequency HO	SHO	HHO (SHO: FFS)	Difference	HHO is a requirement; SHO: FFS
Inter-frequency HO	HHO	HHO	-	

[1] This value was chosen to support uncoordinated operation

		ARIB-TDD	UTRA-TDD (ETSI)	difference?	Recommendation in case of difference
DL	Data mod	QPSK	QPSK	-	
	Spreading mod.	QPSK	QPSK, phase transition restrictions	Difference	take ETSI
	Spreading code	1 symbol length OVSF	1 symbol length OVSF	-	
	Scrambling code (cell identification)	10 ms	16 chips	difference; ETSI basic WA	take ETSI; longer scrambling code ffs in case of insufficient performance of short codes
	Training sequence	TCH dedicated pilot symbols, option: TCH dedicated sequence (midamble) Time multiplexed in the middle of the burst	TCH dedicated sequence (midamble) Time multiplexed in the middle of the burst	difference; ETSI basic WA -	take ETSI
	Detection	Coherent	coherent	-	
	Power control	closed loop (0.1-0.8 kbps DCH SIR based)	closed loop (0.1-0.8 k cycles/sec)	-	
	Variable rate accommodation	Orthogonal VSF + Multi-code + Variable_num_slots + DTX + Rate matching	Orthogonal VSF + Multi-code + Variable_num_slots + DTX + Rate matching	-	

		ARIB-TDD	UTRA-TDD (ETSI)	difference?	Recommendation in case of difference
UL	Data mod.	QPSK	QPSK	-	
	Spreading mod.	HPSK	QPSK, phase transition restrictions	difference	take ETSI
	Spreading code	1 symbol length	1 symbol length	-	
	Scrambling code (user identification)	2^9 x 720 ms	16 chips	difference; ETSI basic WA	take ETSI
	Training sequence	TCH dedicated pilot symbols, option: TCH dedicated sequence (midamble) Time multiplexed in the middle of the burst	TCH dedicated sequence (midamble) Time multiplexed In the middle of the burst	difference; ETSI basic WA	take ETSI
	Detection	Coherent	Coherent	-	
	Power control	closed loop (0.8-0.1 kbps DCH SIR based) + fast open loop	Closed loop (0.1-0.8 k cycles/sec), fast open loop for further study	difference	FFS
	Variable rate accommodation	Orthogonal VSF + Multi-code + Variable_num_slots + DTX + Rate matching	Orthogonal VSF + Multi-code + Variable_num_slots + DTX + Rate matching	-	

	ARIB-TDD	**UTRA-TDD (ETSI)**	**difference?**	**Recommendation in case of difference**
Burst parameters	Certain number of data symbols, TFCI, training sequence elements	Certain number of data symbols, TFCI, training sequence elements	difference of figures	take ETSI figures, TPC bits should be introduced in burst structure
Channel Coding	Convolutional codes Turbo codes	Convolutional codes RS codes, Turbo codes	difference, like FDD	will be aligned with FDD
Interleaving	10/20/40/80ms	10/20/40/80ms	-	
Joint detection	Option	shall not be prevented	difference; ETSI basic WA	take ETSI
Rate detection	fixed TFCI (with/without blind detection)	variable TFCI	difference, like FDD	take ETSI, i.e. concept (not the figures) aligned with FDD, exact details FFS
Random Access	message (10 ms), SF = 128, 32	RACH dedicated slot(s)	difference; SF ETSI basic WA	One slot RACH, details (concerning round trip delay & delay spread) FFS

	ARIB-TDD	**UTRA-TDD (ETSI)**	**difference?**	**Recommendation in case of difference**
CCCH	all DL slots	one or two slots for CCCH	difference; ETSI basic WA	introduce a one-slot concept (SCH and CCCH in TS#k); a concept with SCH in two TS and with CCCH in the same two TS (SCH and CCCH in TS#k and TS#k+8); a concept with SCH in two TS and with pointing to the first CCCH slot (SCH in TS#k and TS#k+8, CCCH in TS#i, i=0...15, pointing to TS#i); complexity of pointing and changing cycles to be investigated; position of SCH (value of k) in frame can change on a long term basis

	ARIB-TDD	**UTRA-TDD (ETSI)**	**difference?**	**Recommendation in case of difference**
Dynamic channel allocation	None	Supported	difference; ETSI basic WA	take ETSI; DCA required; especially the measurements need to be standardised which are the inputs for the DCA algorithm; details FFS
Tx antenna diversity	Mandatory	open	difference	Take STD from ARIB; add sentence on antenna distance[2]; other schemes FFS; capacity benefit to be investigated
Switching point configuration	Flexible	flexible	-	
Timing advance	None	included	difference	take ETSI
Multi-Frame Length	720 ms	720 ms	-	
DTX	pilot symbols sent	not defined yet in detail	difference	DTX included, details FFS

[2] The sentence reads: „STD can be applied if the distance between the different transmit antennas is small enough so that the delay profile from each antenna is almost the same“

	ARIB-TDD	UTRA-TDD (ETSI)	difference?	Recommendation in case of difference
ODMA	not included	included	difference	this has been identified at the WG1#1 meeting as a new concept for non-ETSI members; we encourage non-ETSI members to investigate and study ODMA and send their feedback; [some information has recently been distributed in 3GPP and cf. also TDoc 86/99]

4 Items for further study

In the table in section 3, items for further study have been identified, cf. the remarks in the column „recommendation".

Tdoc 100/99 by Panasonic, in which more details on some of the items for further study in the table in section 3 are given, was presented in the physical meeting of the TDD ad hoc group on Feb. 22. The outcome of the discussion on the open items treated in Tdoc 100/99 are included in the column „recommendation" in the table in section 3. Some concerns and positive points on ODMA were raised in Tdoc 100/99. Since the TDD ad hoc has no mandate concerning ODMA, only limited discussion took place on this issue. The discussion should be held in the plenary.

It was decided to draft a liaison statement to the Layer 2/3 and architecture group and to WG4 concerning TDD specific protocol functions, location of DCA etc. Otto Lehtinen volunteered to draft the liaison statement which should be discussed in the plenary. The TDoc number is 107/99.

Tdoc 109/99 by Ericsson was presented in the physical meeting of the TDD ad hoc group. It contains a list of some technical items of the Chinese RTT proposal (adaptive antennas, uplink synchronisation, baton handover). The meeting welcomed further harmonisation with the Chinese RTT proposal.

Joint predistortion was mentioned as another item for further study.

5 Editing of the TDD specification documents

In Tdocs 75/99 and 76/99, a proposal is given how the S1.24 and S1.23 documents, respectively, should be updated to reflect the recommendations listed in section 3. All S1.2x documents should be updated based on the recommendations given in section 3.

6 Conclusion

It is recommended by Ad Hoc #1 to modify the existing set of WG1 specifications for TDD based on the given recommendations in chapter 3.

7 Annex: Participants of the physical TDD ad hoc meeting, Feb. 22, 9:30-12:45

Anja Klein, Siemens (chair)
Osamu Kato, Panasonic (vice chair)
Toshiyuki Futakata, NTT DoCoMo
Pascal Agin, Alcatel
Bruno Schuffenecker, France Telecom
Keith Mayes, Vodafone
Richard Burbidge, Motorola
Fatih Ozluturk, InterDigital
Sung-Hyuk Shin, InterDigital
Steve Dick, InterDigital
Rossella DeBenedittis, Italtel
Sergio Cioci, Italtel
Makis Kasapidis, Panasonic
Michel Jansen, Ericsson
Otto Lehtinen, Nokia
Peter Mangold, Bosch
Kenji Ito, Siemens
Donald J. Bowen, AT&T
Stefan Oestreich, Siemens
Thomas Ulrich, Siemens