

Source: Motorola, Nokia, Ericsson, Vodafone Group, Mannesmann Mobilfunk
Title: **Proposal for Rel-5 work item on HSDPA**

Introduction

In RAN#7 a study item on High Speed Downlink Packet Access was approved in TSG-RAN. The aim of the study was to look at the feasibility and potential of various techniques such as Adaptive Modulation and Coding and Hybrid ARQ for increasing throughput and peak data rates with concomitant reduction in delay.

Status

The following techniques have been proposed through contributions in RAN WG1 and WG2:

- Adaptive Modulation and Coding
- Hybrid ARQ
- Scheduling at the Node B
- Fast Cell Selection
- Multiple Input Multiple Output Antenna Techniques
- Stand alone DSCH

In RAN WG2 a protocol architecture proposing a new entity - the MAC-HSDSCH was proposed. This entity is resident in the Node B and provides the HARQ and scheduling of the HSDPA channel functionality. The architecture was seen to be feasible and more importantly supported the co-existence of R99 terminals with terminals supporting HSDPA. This is due to the continued location of the RLC and MAC-d entities at the RNC as in R99.

RAN WG1 has considered numerous contributions addressing the simulations of AMC and HARQ in consort with scheduling with Node B. These simulations have demonstrated the potential for significant gains in the peak and average data rates and throughput of a channel incorporating Adaptive Modulation and Coding and Hybrid-ARQ, with scheduling performed for this channel at the Node B.

The details of the proposed techniques and the conclusions and recommendations have been captured in TR 25.950 v2.0.0.

Proposal

In the light of the above mentioned studies and conclusions, it is proposed that a new work item be approved - HSDPA feature.

Feature: HSDPA

Linked Work Items (Building Blocks for Feature)

- HSDPA Physical Layer
- HSDPA Layer 2 and 3 Protocol Aspects
- HSDPA UTRAN Iub/Iur Protocol Aspects
- HSDPA RF Radio Transmission/ Reception, System Performance Requirements and Conformance Testing

The various work tasks described here apply to both FDD and TDD. In the specific instances where there are differences between TDD and FDD, these should be treated as separate work tasks.

For the physical Layer (HSDPA Physical Layer Building Block) the following work tasks need to be addressed

- Physical and Transport Channels mapping
- High Order Modulation
- Multiplexing and Hybrid ARQ Channel Coding
- Physical Layer procedures

For Layer 2 and 3 protocol aspects Building Block, the following work tasks need to be addressed

- Architecture aspects
- MAC entity (Scheduling and Hybrid ARQ protocol)
- Interlayer procedures in connected mode
- Control plane aspects
- UE capabilities

For the HSDPA UTRAN Iub/Iur Protocol Aspects the following work tasks need to be addressed

- Iub and Iur architecture aspects
- Iub and Iur control plane aspects
- Iub and Iur user plane aspects

For the HSDPA RF Radio Transmission/ Reception, System Performance Requirements and Conformance Testing Building Block the following work tasks need to be addressed

- UE radio transmission and reception
- BTS radio transmission and reception
- BTS Conformance testing
- Requirements for support of Radio Resource Management

Multiple Input and Multiple Output Antenna Techniques are seen as exciting and potentially valuable and it is therefore proposed that studies should continue in investigating various MIMO techniques in order to come up with the best possible solution with regard to performance and UE complexity with the final Release to be decided as early as possible. The study item sheet can be found in RP-010213.

Similarly, additional studies are proposed for Fast Cell selection in order to enable a conclusion on the benefits of FCS. A separate study item is therefore proposed for this technique as well, this can be found in RP-010227.

It is also proposed that following an affirmative decision on the HSDPA WI proposal attached here, a LS be sent to TSG-T to highlight the need for a WI on test aspects of HSDPA in TSG-T.

High Speed Downlink Packet Access (HSDPA)

Work Item Description

Title

High Speed Downlink Packet Access

1 3GPP Work Area

X	Radio Access
	Core Network
	Services

2 Linked work items

HSDPA Physical Layer
HSDPA Layer 2 and 3 Protocol Aspects
HSDPA UTRAN Iub/Iur Protocol Aspects
HSDPA RF Radio Transmission/ Reception, System Performance Requirements and Conformance Testing

3 Justification

In RAN#7 a study item on High Speed Downlink Packet Access was approved. The aim of the study was to look at the feasibility and potential of various techniques such as Adaptive Modulation and Coding and Hybrid ARQ for increasing throughput and peak data rates with reduction in concomitant delay. Since RAN#7, RAN WG1 and RAN WG2 have considered many contributions on this subject and have concluded on the feasibility and potential of various techniques and provided recommendations on the inclusion of these techniques for Rel-5. This work item is in line with the recommendations from WG2 and WG1.

4 Objective

The technical objective of this work item is the integration of HSDPA functionality in UTRA, in line with recommendations from WG1 and WG2, to increase the throughput and peak data rates while reducing the overall delay. The works tasks include support for both FDD and TDD. In those cases where differences between FDD and TDD are identified, they should be considered as separate work tasks.

- For physical layer, the features include:
 - Physical and Transport Channels mapping
 - Higher Order Modulation
 - Multiplexing and Hybrid ARQ Channel Coding
 - Physical Layer procedures
- For higher layers:
 - Architecture aspects
 - MAC entity (Scheduling and Hybrid ARQ protocol)
 - Interlayer procedures in connected mode
 - Control plane aspects

- UE capabilities
- For Iur/Iub interface:
For the adoption of HSDPA some modifications to the present Iub and Iur signalling and user data streams will need to be included.
- For radio transmission and reception:
 - UE radio transmission and reception
 - BTS radio transmission and reception
 - BTS Conformance testing
 - Requirements for support of Radio Resource Management

5 Service Aspects

None

6 MMI-Aspects

None

7 Charging Aspects

None

8 Security Aspects

None

9 Impacts

Affects :	USIM	ME	AN	CN	Others
Yes		X	X		
No	X			X	X
Don't know					

10 Expected Output and Time scale (to be updated at each plenary)

New specifications						
Spec No.	Title	Prime resp. WG	2ndary resp. WG(s)	Presented for endorsement at plenary#	Approved at plenary#	Comments
Affected existing specifications						
Spec No.	CR	Subject			Approved at plenary#	Comments

The expected finalisation date is TSG-RAN #14

11 Work item rapporteurs

Ravi Kuchibhotla (Motorola)

12 Work item leadership

TSG-RAN WG2

13 Supporting Companies

Motorola, Nokia, Ericsson, Vodafone Group, Mannesmann Mobilfunk

14 Classification of the WI (if known)

X	Feature (go to 14a)
	Building Block (go to 14b)
	Work Task (go to 14c)

14a The WI is a Feature: List of building blocks under this feature

(list of Work Items identified as building blocks)

HSDPA Physical Layer

HSDPA Layer 2 and 3 Protocol Aspects

HSDPA UTRAN Iub/Iur Protocol Aspects

HSDPA RF Radio Transmission/ Reception, System Performance Requirements and Conformance Testing

14b The WI is a Building Block: parent Feature

(one Work Item identified as a feature)

14c The WI is a Work Task: parent Building Block

(one Work Item identified as a building block)

High Speed Downlink Packet Access (HSDPA) - *Physical Layer*

Work Item Description

Title

High Speed Downlink Packet Access - Physical Layer

1 3GPP Work Area

X	Radio Access
	Core Network
	Services

2 Linked work items

HSDPA Layer 2 and 3 Protocol Aspects
HSDPA UTRAN Iub/Iur Protocol Aspects
HSDPA RF Radio Transmission/ Reception, System Performance Requirements and Conformance Testing

3 Justification

The study item on HSDPA was concluded in RAN WG#11 with recommendations on the techniques to be included in Rel-5. This work item enables the inclusion of the identified techniques at the physical layer.

4 Objective

The technical objective of this work item is the integration of HSDPA physical layer functionality in UTRA, while maintaining commonality with the R99 general physical layer aspects to the maximum extent possible.

- For physical layer, the features include:
 - Physical and Transport Channels mapping
 - Higher Order Modulation
 - Multiplexing and Hybrid ARQ Channel Coding
 - Physical Layer procedures

The work task for physical layer procedures will also consider additional physical layer measurements that may be required.

5 Service Aspects

None

6 MMI-Aspects

None

7 Charging Aspects

None

8 Security Aspects

None

9 Impacts

Affects :	USIM	ME	AN	CN	Others
Yes		X	X		
No	X			X	X
Don't know					

10 Expected Output and Time scale (to be updated at each plenary)

New specifications						
Spec No.	Title	Prime resp. WG	2ndary resp. WG(s)	Presented for endorsement at plenary#	Approved at plenary#	Comments
Affected existing specifications						
Spec No.	CR	Subject			Approved at plenary#	Comments
25.201		Physical layer – General description			RAN#14	
25.211		Physical channels and mapping of transport channels onto physical channels (FDD)			RAN#14	
25.212		Multiplexing and channel coding (FDD)			RAN#14	
25.213		Spreading and modulation (FDD)			RAN#14	
25.214		Physical layer procedures(FDD)			RAN#14	
25.221		Physical channels and mapping of transport channels onto physical channels (TDD)			RAN#14	
25.222		Multiplexing and channel coding (TDD)			RAN#14	
25.223		Spreading and modulation (TDD)			RAN#14	
25.224		Physical layer procedures(TDD)			RAN#14	

The expected finalisation date is TSG-RAN #14

11 Work item raporteurs

Amitava Ghosh (Motorola)

12 Work item leadership

TSG-RAN WG1

13 Supporting Companies

Motorola, Nokia, Ericsson, Vodafone Group, Mannesmann Mobilfunk

14 Classification of the WI (if known)

	Feature (go to 14a)
X	Building Block (go to 14b)
	Work Task (go to 14c)

14a The WI is a Feature: List of building blocks under this feature

14b The WI is a Building Block: parent Feature

High Speed Downlink Packet Access (HSDPA)

14c The WI is a Work Task: parent Building Block

High Speed Downlink Packet Access (HSDPA) - *layer 2 and 3 aspects*

Work Item Description

Title

High Speed Downlink Packet Access - layer 2 and 3 aspects

1 3GPP Work Area

X	Radio Access
	Core Network
	Services

2 Linked work items

HSDPA Physical Layer
HSDPA UTRAN Iub/Iur Protocol Aspects
HSDPA RF Radio Transmission/ Reception, System Performance Requirements and Conformance Testing

3 Justification

The study item on HSDPA was concluded in RAN WG#11 with recommendations on the techniques to be included in Rel-5. This work item enables the inclusion of the identified techniques at layers 2 and 3.

4 Objective

The technical objective of this work item is the integration of HSDPA physical layer functionality in UTRA, while maintaining commonality with the R99 general layer 2 and 3 aspects to the maximum extent possible. While most of the control aspects will be identical to those for R99, some additional signaling for the configuration of HSDPA channels will need to be defined. Also, in order to enable the support of fast scheduling, support for a new MAC-HSDSCH entity shall be included. This new entity at the Node B will handle all the scheduling and HARQ (non-physical layer aspects) of the HSDPA feature. UE capabilities will need to be updated to indicate support of HSDPA. Physical Layer aspects of UE capabilities will be handled by WG1.

- For layers 2 and 3, the features include:
 - Architecture aspects
 - MAC entity (Scheduling and Hybrid ARQ protocol)
 - Interlayer procedures in connected mode
 - Control plane aspects
 - UE capabilities

5 Service Aspects

None

6 MMI-Aspects

None

7 Charging Aspects

None

8 Security Aspects

None

9 Impacts

Affects :	USIM	ME	AN	CN	Others
Yes		X	X		
No	X			X	X
Don't know					

10 Expected Output and Time scale (to be updated at each plenary)

New specifications						
Spec No.	Title	Prime rsp. WG	2ndary rsp. WG(s)	Presented for endorsement at plenary#	Approved at plenary#	Comments
Affected existing specifications						
Spec No.	CR	Subject			Approved at plenary#	Comments
25.301		Radio interface protocol architecture			RAN#14	
25.302		Service provided by the physical Layer			RAN#14	
25.303		UE functions and Inter-layer procedures in connected mode			RAN#14	
25.306		UE Radio Access Capabilites			RAN#14	
25.321		Medium access control (MAC) protocol specification			RAN#14	
25.331		Radio resource control (RRC) protocol specification			RAN#14	

The expected finalisation date is TSG-RAN #14

11 Work item raporteurs

Ravi Kuchibhotla (Motorola)

12 Work item leadership

TSG-RAN WG2

13 Supporting Companies

Motorola, Nokia, Ericsson, Vodafone Group, Mannesmann Mobilfunk

14 Classification of the WI (if known)

	Feature (go to 14a)
X	Building Block (go to 14b)
	Work Task (go to 14c)

14a The WI is a Feature: List of building blocks under this feature

14b The WI is a Building Block: parent Feature

High Speed Downlink Packet Access (HSDPA)

14c The WI is a Work Task: parent Building Block

High Speed Downlink Packet Access (HSDPA) - Iub/Iur Protocol Aspects

Work Item Description

Title

High Speed Downlink Packet Access - Iub/Iur Protocol Aspects

1 3GPP Work Area

X	Radio Access
	Core Network
	Services

2 Linked work items

HSDPA Physical Layer
HSDPA Layer 2 and 3 Protocol Aspects
HSDPA RF Radio Transmission/ Reception, System Performance Requirements and Conformance Testing

3 Justification

The study item on HSDPA was concluded in RAN WG#11 with recommendations on the techniques to be included in Rel-5. This work item enables support of the identified techniques over the Iub and Iur.

4 Objective

The technical objective of this work item is the integration of HSDPA physical layer functionality in UTRA, while maintaining commonality with the R99 general Iub and Iur aspects to the maximum extent possible. While most of the control aspects will be identical to those for R99, some additional signaling for the configuration of HSDPA shared channels will need to be defined. Also frame protocol for the user data stream will need to be defined for the HSDPA shared channels. Flow control for the HSDPA channels on the Iub will need to be supported.

- For Iub and Iur, the features include:
 - Iub and Iur architecture aspects
 - Iub and Iur control plane aspects
 - Iub and Iur user plane aspects

5 Service Aspects

None

6 MMI-Aspects

None

7 Charging Aspects

None

8 Security Aspects

None

9 Impacts

Affects :	USIM	ME	AN	CN	Others
Yes		X	X		
No	X			X	X
Don't know					

10 Expected Output and Time scale (to be updated at each plenary)

New specifications						
Spec No.	Title	Prime rsp. WG	2ndary rsp. WG(s)	Presented for endorsement at plenary#	Approved at plenary#	Comments
Affected existing specifications						
Spec No.	CR	Subject			Approved at plenary#	Comments
TS 25.401		UTRAN Overall Description			RAN #14	
TS 25.420		UTRAN Iur Interface: General Aspects and Principles			RAN #14	
TS 25.422		UTRAN Iur interface signalling transport			RAN #14	
TS 25.423		UTRAN Iur Interface RNSAP Signalling			RAN #14	
TS 25.424		UTRAN Iur interface data transport & transport signalling for CCH data streams			RAN #14	
TS 25.425		UTRAN Iur interface user plane protocols for CCH data streams			RAN #14	
TS 25.426		UTRAN I _{ur} and I _{ub} Interface Data Transport & Transport Signalling for DCH Data Streams			RAN #14	
TS 25.430		UTRAN I _{ub} Interface General Aspects and Principles			RAN #14	
TS 25.432		UTRAN Iub interface signalling transport			RAN #14	
TS 25.433		UTRAN Iub Interface NBAP Signalling			RAN #14	
TS 25.434		UTRAN Iub interface data transport & transport signalling for CCH data streams			RAN #14	
TS 25.435		UTRAN Iub interface user plane protocols for CCH data streams			RAN #14	
TS 25.442		UTRAN Implementation Specific O&M Transport			RAN #14	

The expected finalisation date is TSG-RAN #14

11 Work item rapporteurs

Mike Diesen, Motorola

12 Work item leadership

TSG-RAN WG3

13 Supporting Companies

Motorola, Nokia, Ericsson, Vodafone Group, Mannesmann Mobilfunk

14 Classification of the WI (if known)

	Feature (go to 14a)
X	Building Block (go to 14b)
	Work Task (go to 14c)

14a The WI is a Feature: List of building blocks under this feature

14b The WI is a Building Block: parent Feature

High Speed Downlink Packet Access (HSDPA)

14c The WI is a Work Task: parent Building Block

High Speed Downlink Packet Access (HSDPA) - *RF Radio Transmission/ Reception, System Performance Requirements and Conformance Testing*

Work Item Description

Title

High Speed Downlink Packet Access - RF Radio Transmission/ Reception, System Performance Requirements and Conformance Testing

1 3GPP Work Area

X	Radio Access
	Core Network
	Services

2 Linked work items

HSDPA Physical Layer
HSDPA Layer 2 and 3 Protocol Aspects
HSDPA UTRAN Iub/Iur Protocol Aspects

3 Justification

The study item on HSDPA was concluded in RAN WG#11 with recommendations on the techniques to be included in Rel-5. This work item supports the specifications of the various RF characteristics of the HSDPA feature as they impact the base station and mobile station performance and the radio resource management aspects.

4 Objective

The technical objective of this work item is the description of the HSDPA characteristics, the system performance requirements and conformance testing.

- For radio transmission and reception:
 - UE radio transmission and reception
 - BTS radio transmission and reception
 - BTS Conformance testing
 - Requirements for support of Radio Resource Management

5 Service Aspects

None

6 MMI-Aspects

None

7 Charging Aspects

None

8 Security Aspects

None

9 Impacts

Affects :	USIM	ME	AN	CN	Others
Yes		X	X		
No	X			X	X
Don't know					

10 Expected Output and Time scale (to be updated at each plenary)

New specifications						
Spec No.	Title	Prime resp. WG	2ndary resp. WG(s)	Presented for endorsement at plenary#	Approved at plenary#	Comments
Affected existing specifications						
Spec No.	CR	Subject			Approved at plenary#	Comments
25.101		UE Radio Transmission and Reception (FDD)			RAN#14	
25.102		UE Radio Transmission and Reception (TDD)			RAN#14	
25.104		UTRA (BS) FDD; Radio transmission and Reception			RAN#14	
25.105		UTRA (BS) TDD; Radio transmission and Reception			RAN#14	
25.123		Requirements for support of Radio Resource Management (TDD)			RAN#14	
25.133		Requirements for support of Radio Resource Management (FDD)			RAN#14	
25.141		Base station conformance testing(FDD)			RAN#14	
25.142		Base station conformance testing(TDD)			RAN#14	

The expected finalisation date is TSG-RAN #14

11 Work item raporteurs

Howard Benn (Motorola)

12 Work item leadership

TSG-RAN WG4

13 Supporting Companies

Motorola, Nokia, Ericsson, Vodafone Group, Mannesmann Mobilfunk

14 Classification of the WI (if known)

X	Feature (go to 14a)
	Building Block (go to 14b)
	Work Task (go to 14c)

14a The WI is a Feature: List of building blocks under this feature

(list of Work Items identified as building blocks)

14b The WI is a Building Block: parent Feature

High Speed Downlink Packet Access (HSDPA)

14c The WI is a Work Task: parent Building Block

(one Work Item identified as a building block)