**TSG-RAN meeting #3** *TSGR#3(99)269*
**Yokohama, Japan, 21-23, April 1999**

**Agenda Item:** **6.2**

**Source:** **Editor**

**Title:** **Draft Version of 3GPP TSG RAN WG2 TR R2.05 V0.0.1: on “Opportunity Driven Multiple Access (ODMA)“**

**Document for:** **Information**

During the last meeting of 3GPP TSG RAN WG2 a new TR R2.05 on "Opportunity Driven Multiple Access" was created. The report aims to provide a review of the operational aspects of using ODMA. An initial structure and text was approved for inclusion in the report.

# TR RAN R2.05 V0.0.1 (1999-04)

*Technical Report*

**3rd Generation Partnership Project (3GPP);**
**Technical Specification Group (TSG) RAN;**
**Working Group 2 (WG2);**

# Opportunity Driven Multiple Access (ODMA)

Reference

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***3GPP***

Postal address

Office address

Internet

secretariat@3gpp.org

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# Contents

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*[Editor's note: This section needs to be reviewed. It is assumed here than a 3GPP IPR report will be available in the near future.]*

# Foreword

This Technical Recommendation has been produced by the 3rd Generation Partnership Project, Technical Specification Group RAN.
The contents of this TR may be subject to continuing work within the 3GPP and may change following formal TSG approval. Should the TSG modify the contents of this TR, it will be re-released with an identifying change of release date and an increase in version number as follows:

Version m.t.e
where:

- m indicates [major version number]
- x the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- y the third digit is incremented when editorial only changes have been incorporated into the specification.

# 1. Scope

TBD

# 2. References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an TS shall also be taken to refer to later versions published as an EN with the same number.


[1] [1] 3GPP Homepage: www.3GPP.org
[2] [2] S2.01, Radio Interface Protocol Architecture
[3] [3] S2.02, Layer 1; General requirements
[4] [4] S2.03, UE States and Procedures in Connected Mode

[5] [5] S2.04, Description of procedures in idle Mode
[6] [6] S2.22, Description of RLC protocol
[7] [7] S2.31, Description of RRC protocol
[8] [8] S2.40, Description of principles for error handling and message description
[9] [9] ETSI UMTS 25.XX: "Vocabulary for the UTRAN"
[10][10] S1.25, Measurements TDD

# 3. Definitions, abbreviations and symbols

## 3.1 Definitions

See [9] for a definition of fundamental concepts and vocabulary.

## 3.2 Abbreviations

| | |
|---|---|
| OCCCH | ODMA Common Control Channel |
| ODCCH | ODMA Dedicated Control Channel |
| ODCH | ODMA Dedicated Channel |
| ODMA | Opportunity Driven Multiple Access |
| ORACH | ODMA Random Access Channel |
| ODTCH | ODMA Dedicated Traffic Channel |
| TDD | Time Division Duplex |
| UE | User Equipment |
| $UE_R$ | User Equipment with ODMA relay operation enabled |
| UL | Uplink |
| UMTS | Universal Mobile Telecommunications System |
| URA | UTRAN Registration Area |
| UTRA | UMTS Terrestrial Radio Access |
| UTRAN | UMTS Terrestrial Radio Access Network |

## 3.3 Symbols

# 4. Opportunity Driven Multiple Access

ODMA is a communications relaying protocol, which may be used to increase the efficiency of UMTS. One way in which this is achieved is by increasing the range of high data rate services. The concept of ODMA was introduced at ETSI SMG2 in 1996, after which a number of contributions have been presented.

## 4.1 ODMA Infrastructure Configurations

FFS

## 4.2 ODMA Probing and Route Acquisition

FFS

## 4.3 ODMA Efficiency and Power Requirements

FFS

## 4.4 ODMA Physical Layer Burst Mapping

FFS

## 4.5 ODMA Idle Mode Procedures

FFS

## 4.6 ODMA Connected Mode Procedures

FFS

# 5. Annex

## 5.1 Frequently Asked Questions

**Question 1**

In highly connected networks, delay per hop decreases. Is it not likely in such cases the mean distance covered by each hop is shortened so that the reduced delay per hop is offset by an increase in the number of hops per path. The total end to end delay may actually increase. Have we examined this?

### Answer 1

As the density of stations increases, the path loss between stations typically reduces as a 40 log D relationship. Therefore the data rate that can be used between stations increases at the same rate. The delay of a multi-hop network reduces as the density goes up, even if there are more relays. For example if the relay distance is halved, the number of hops is doubled, the path loss per hop is reduced by 12 dB and the data rate can be increased by ten times or so (at the same power level), and therefore overall delay is reduced by five. This is a non-intuitive conclusion and holds, providing the data rate can be continually increased. In addition, the amount of joules of energy required to move the data over the relays is reduced in total by five times. Overall there is an improvement in performance through using more relay hops.
At some point the maximum data rate is reached, due to bandwidth allocation or complexity problems, at which point the number of hops needs to be curtailed based upon the maximum delay.

### Question 2

ODMA should not focus entirely on urban deployments. The large increase in the number of basestations that we suggest UMTS needs compared with GSM actually only applies to the rural (i.e. noise-limited) case - hence "universal" UMTS remains uneconomic. Surely if ODMA sticks to the non-fading wideband relaying the required ranges can be achieved - albeit at 100mW mean power ?

### Answer 2

Wide area coverage in the rural environment, particularly if this is used as an extension of the high data rate services within a rural cell, is an important application of ODMA. Particularly in rural environments where there are sparse population densities strung out along roads or in clusters, the use of seeds and subscriber relay to fixed subscribers or via fixed subscribers will provide significant advantages.

### Question 3

What are the average sleeping patterns on 720 ms multi-frame?

### Answer 3

FFS

### Question 4

How many times and during how many slots and frames does the UE listens to the RACH, ORACH?

### Answer 4

FFS

### Question 5

What is the duty cycle of probing on the RACH, ORACH?

### Answer 5

FFS

### Question 6

Over how many slots are receive and transmit associated with relaying functionality?

### Answer 6

FFS

# 6. History

| **Document history** | | |
|---|---|---|
| **Date** | **Version** | **Comment** |
| April 1999 | 0.0.1 | Report was created with initial heading included from document R2-99287. |
| Rapporteur for 3GPP TSG RAN WG2 R2.05 is: | | |

Alan Law
Communications Security and Advanced Development
Vodafone Ltd
The Courtyard
2-4 London Road
Newbury
Berkshire
RG14 1JX
United Kingdom

Tel.: +44 (0)1635 676470
Fax: +44 (0)1635 676147

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