


Agenda

- Architecture and coverage of the Orange France broadband mobile network
 - > Broadband Mobile network built on UMTS and EDGE
- Technical process for the roll out of the Orange France UMTS network
 - > QoS indicators
- Features and Services provided by the Orange France broadband mobile network
 - > Some commercial results
 - > UMTS roaming aspects
- Methods to reach a high QoS in a dense UMTS environment

 ■ Moving to HSDPA

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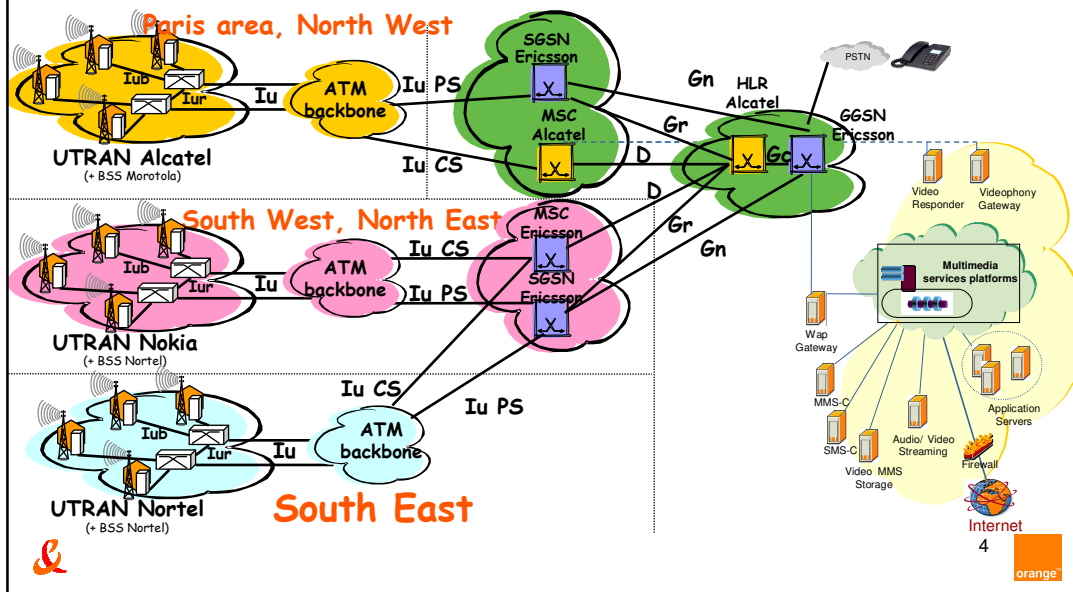


Architecture and coverage of the Orange France broadband mobile network

Broadband Mobile network built on UMTS and EDGE



Our present Architecture



Some characteristics of the Orange France Radio deployment

- When UMTS service is offered in a city, the UMTS radio coverage is provided as well in the surroundings of this city meaning that suburban areas and rural areas around this city are covered as well
 - The definition of this marketing areas relies on the experience that we deduce from the behaviour of our GSM subscribers.

- Most of the existing GSM sites should be reused, they should be turned in GSM/UMTS sites (GSM/UMTS cositing)
 - When the existing GSM grid is not sufficient to provide the throughputs necessary in a given area, some pure UMTS sites are added.

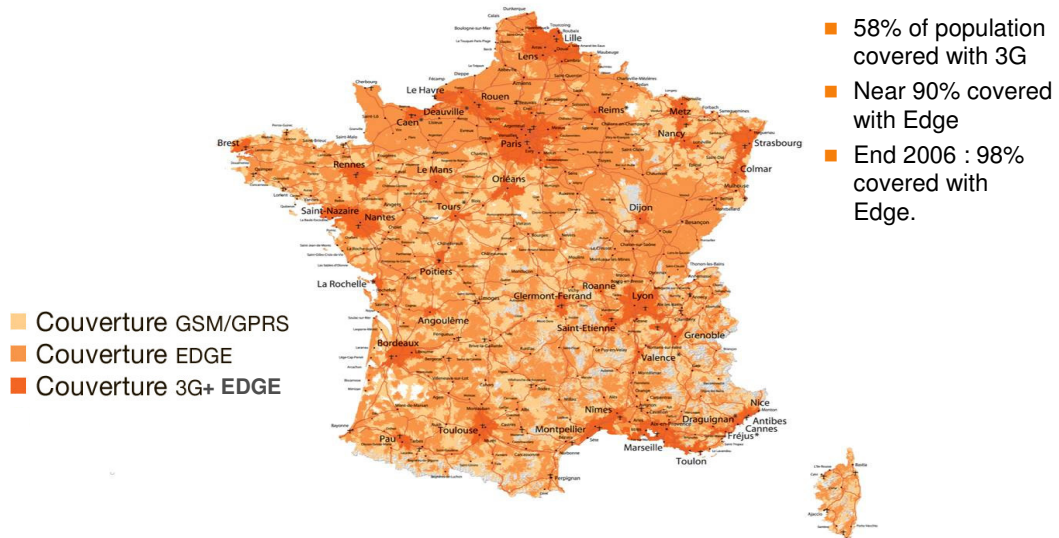
- As we use GSM/UMTS cositing we had to verify that the two radio systems can coexist
 - In order to guarantee that, we performed tests in September 2001 on three sites of our UMTS trial network which were as well sites of our GSM commercial network.
 - Both the analysis of the counters and the different measurements showed that the UMTS equipment do not cause any quality degradation on the service provided by the collocated GSM equipment.



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Orange France coverage GSM/GPRS + 3G + EDGE



- Couverture GSM/GPRS
- Couverture EDGE
- Couverture 3G+ EDGE

- 58% of population covered with 3G
- Near 90% covered with Edge
- End 2006 : 98% covered with Edge.



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Continuity of service

- GSM/UMTS dual mode features (selection/reselection and handover) are implemented in both the infrastructures and the terminals. Services fallbacks are implemented in order that the UMTS subscribers can benefit from the GSM coverage

- For speech the GSM/UMTS handover ensures the continuity of service in both directions with terminals compliant to Release 99

- Packet on DCH, from UMTS to EDGE/GPRS
 - >The service may continue on EDGE/GPRS but the throughput will evidently be lower



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Technical process for the roll out of the Orange France UMTS network

QoS indicators



General process deduced from our studies, our technical tests and services trials

- The different IOT shall be ensured
 - on the network side
 - > With our different trials we ensured the interworking between Alcatel UTRAN and Ericsson CN, between Nokia UTRAN and Ericsson CN, between Nortel UTRAN and Ericsson CN
 - > We ensured the 3G/2G handovers between radio infrastructures from different manufacturers, after that it is necessary to optimise the compressed mode parameters
 - and
 - between the network and the terminals
 - > We use the GCF certification. In addition we perform some complementary tests

- After the network is rolled out in a given area, the following steps shall be performed :
 - Radio optimisation
 - Test of the radio optimisation
 - Test of the end to end Quality of Service

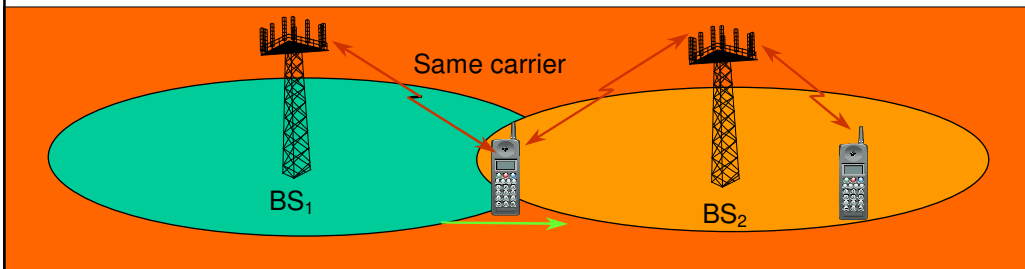


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The radio optimisation process has to take into account ... the Soft Handover

- On the cell border an MS establishes more than one radio link, this improves coverage and capacity

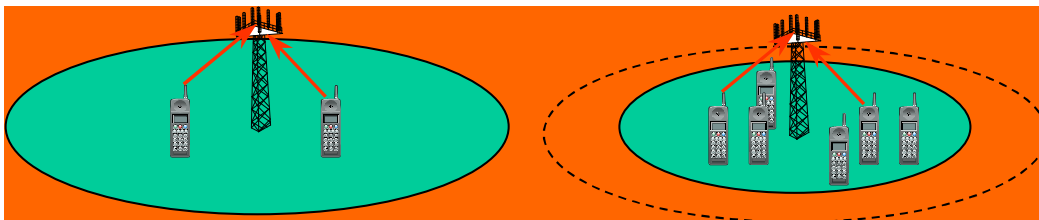


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The radio optimisation process has to take into account ... the Cell breathing effect

- The coverage may reduce when the traffic increases
 - > « Cell Breathing »
- Power Control
 - > Transmitted power shall vary in order to reach the desired radio quality
 - > It shall be minimum in order to minimise the global interference
- Load control



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Main steps of the Radio optimisation process

- First step of the radio optimisation : antenna tuning
 - Antenna tilts, antenna azimuths ...
- Further steps : parameters tuning
 - Power transmitted by the common channels, handover algorithms
- Then an audit of the radio optimisation shall be performed
 - Measurements are performed in both loaded and unloaded conditions
 - Measurements are performed in outdoor conditions and in indoor conditions



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The QoS Indicators

- Orange based their contractual KPIs on measurements which describe the customer perception
- Circuit switched domain
 - Success rate of voice calls connections
 - Success rate of visiophony calls connections
 - Success rate of voice calls maintained during X minute(s)
 - Success rate of visiophony calls maintained during X minute(s)
 - Success rate of voice calls presenting a correct voice quality
 - Voice calls connections times
 - Visiophony calls connections times
 - All the performance are measured in MO, MTC and MTM cases
- Packet switched domain
 - Success rate of internet connections
 - Internet connections times
 - Downloading times of an HTML pages
 - E-mail transmission times
 - E-mail reception times
 - Throughputs measurements; the purpose of these indicators is to ensure that the actual throughputs are close to theoretical values (e.g. 64UL/128DL, 64UL/384DL, 128UL/384 DL ...)



Features and services provided by the Orange France broadband mobile network

Some commercial results
UMTS roaming aspects



Feature and services in the Orange France Network

- GSM and GPRS services have been implemented in the Orange France UMTS network
 - Speech, SMS, Voice Mail, supplementary services, CAMEL features, SIM toolkit, MMS, WAP services, WEB browsing, data transfer.
- Some of these services will be improved by the use of the high throughputs provided by UMTS
- In addition we provide innovative services
 - Video telephony
 - Live TV
 - Audio/video streaming
 - Download of multimedia content (including video)
 - Infotainment (WAP pull; MMS push)
 - Off-line games, on line games
 - Video messaging via MMS
 - Live sport Event
 - Video responder
 - Presence
 - Email



More images for the best customer experience

2001 **Black & white**

-- Orange.fr --

- Evénements
- Chercher...
- Gallerie>>
- Chat/Mail (1)
- Sonneries/Logos
- Jeux/Musique
- Actu/Météo
- Sport
- Cinéma/Sorties

2002 **Colour**

Sp dermer

- Evénements
- Chercher...
- Gallerie>>
- Chat/Mail (1)
- Sonneries/Logos
- Jeux/Musique
- Actu/Météo
- Sport
- Cinéma/Sorties
- Horoscope/Télé
- Trafic/Itinéraire
- Annuaire
- Télécharger
- > Sommaire A-Z
- < Accueil

2003 **Rich media**

Orange World

Info | pratique | loisirs | amis

Podium : Nom : Bernard Frédéric
Profession : Châlier, chanteur à succès des années 70. >>

Actualité
Visite d'Etat : Le président chinois Hu Jintao est à Paris >>

Rechercher

GALLERY >> Entrée >>

Accès direct

- 1 Actualité
- 2 Sport
- 3 Horoscope
- 4 Télé
- 5 Databases
- 6 Infos trafic
- 7 Cinéma
- 8 Sonneries/Logos
- 9 Ma sélection
- Non connecté

Info | pratique | loisirs | amis

Infos locales

2004 / 2005

Video

Orange World

Video

TV Live

Multi chaînes

Valider

← retour accueil

TV

Orange World

TV Live

Page 1 | 2

Toutes les chaînes

Valider

← retour accueil

Music

Orange World

Music

Page 1 | 2

← retour accueil

Combined with 3G, the Orange World Video portal has multiplied by 20 the number of video sessions.



Live TV - 50 channels, largest offer on the market

Orange exclusive



Other channels



An all in image portal



Portal Richness and animation

9 themes

More than 45 programmes

300 new videos per week

Home Page refresh

- many times a day to push the right content at the right time
- video programmes and pushes are managed like TV or radio channels do



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Feature and Services for the business market

- For the internet access we feature up to 128 kb/s uplink and 384 kb/s downlink
These throughputs are available both with a UMTS/GPRS/EDGE PCMCIA card and with a classical handset
- Innovative and efficient services relying on high throughputs at the radio interface
 - Intranet access, email with attachments
 - Access to the personal environment (mail, agenda)
 - Multimedia messaging with picture and video
 - web conferencing
 - Videotelephony towards fixed and mobile terminals



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Broadband handset range for Q4 2005

Handset Model	Price (€)	Technology
SPV M3000	249 €	EDGE
Samsung D600E	179 €	EDGE
Samsung D500E	99 €	EDGE
SPV C600	99 €	EDGE
Samsung E360E	59 €	EDGE
Samsung E350E	49 €	EDGE
Nokia N70	189 €	3G
Nokia 6680	149 €	3G
Nokia 6280	119 €	3G
Motorola A1000	339 €	3G
Samsung Z500	119 €	3G
Samsung Z300	59 €	3G
LG U 8210	69 €	3G
Sony Ericsson K600i	49 €	3G
Sagem W7	39 €	3G
Sanyo S750i	49 €	3G

Price ranges (PVC):

- > 249 €
- 79 à 159 €
- 49 à 79 €

Some commercial results

■ Consumer market

- At the end of January 2006 more than one **million** customers have chosen the Broadband Mobile offer of Orange France
- **The utilisation of TVLive and Video on Demand has been multiplied by 14** in one year

■ Business market

- At the end of January 2006, **200 000** business customers have chosen the Broadband Mobile offer of Orange France
- September 2004 : just before the commercial launch of 3G on the business, each PC user transmitted **10 Mo per month**
- January 2006 : after the commercial launch of 3G and EDGE, this figure becomes : **80 Mo per month** and per user



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Roaming

- When using a GSM/UMTS terminal, the UMTS subscribers of OrangeFrance are offered a world coverage
 - They benefit from the present GSM roaming agreements concluded between OrangeFrance and the GSM operators
 - This is possible because the MAP protocol is common to GSM and UMTS
- Roaming agreements have been concluded with other UMTS networks
- As MAP is common to GSM and UMTS, the success of GSM roaming can be kept and extended
 - > UMTS subscribers will benefit from the GSM foot print + Japan + Korea



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Roaming 3G footprint

38 3G commercials roaming agreements with 38 partners in 24 countries

3G Inbound roamer from some non partner NW are refused from OF 3G NW (cause#15 is activated)



+ Hong Kong

Japan
(NTT Docomo)

Singapore



Methods to reach a high QoS in a dense UMTS environment

Geo reference your problems

- To manage efficiently the quality offered by a 3G radio access in a big city such as Paris (Inner city + suburbs is covered by more than 1000 sites), information is key.
- Information about each area where QoS does not reach the targeted KPIs and also information about possible solutions to tackle these weaknesses
 - > Monitor the progress and make the right investment choices.
- The skeleton of this information tracking shall be a good geo referenced system.
- Different sources of information :
 - ✓ The predictions of the RF planning tool.
 - ✓ The customer complaints that at the first glance can be linked to radio items.
 - ✓ Regular measurements campaigns performed by the technical teams.
 - ✓ E2E measurements campaigns aimed at assessing the end-user perception.
- Then the operational radio planners are able to divide the problems encountered into coverage or quality issues (or others: alarms, protocols, mobiles) and to define the footprint of each weak zone.
- Then each weak zone will get a status that will evolve : not analysed, actions short term, action long term, action launched, solved

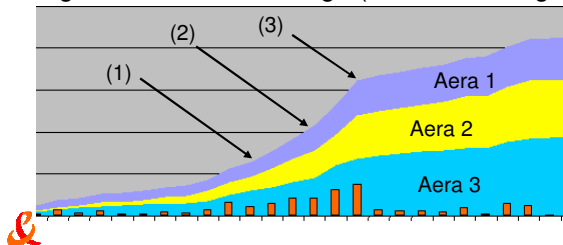
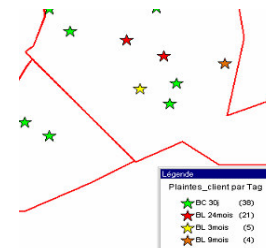


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Customer Complaints Management

- As previously mentioned:
 - The Customer complaints are an additional source of information to assess the quality of the network.
 - Tracking them through a geo referenced system with status correlated to the corrective actions allows accurate feed back to the customer care.
- However the analysis triggered by a customer complaint tagged as radio is time and resource consuming (additional van measurement to reproduce the problem...) and the radio team can easily be overflowed by them if the process leading to a “radio” tag is not accurate enough (radio becoming an easy scapegoat)



- ❖ The cumulative distribution of radio customer complaints starts to become exponential (bug mobile not tracked...) (1)
- ❖ The radio team dedicate half of their time to investigate, other actions are pending (2)
- ❖ You shall react (3)



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Define the “Operational radio laboratory”

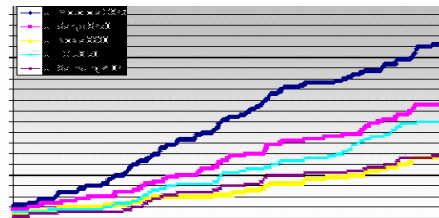
- 3G technology is today far more complex than 2G.
- The interactions between the constituting elements (mobile, UTRAN, CN, services platforms) and their impact on the global services offered to the customer are difficult to assess.
- The operational radio laboratory should be a specific area of the commercial network (at the same SW level than the rest of the network) on which a specific focus is put :
 - The different interfaces: radio (mobile traces) lub and lu through (protocol analyser, probes...) are traced.
 - Some reference roads shall be defined with both excellent 3G radio conditions and occurrences of 2G/3G handovers.
 - Experts from the various domains are gathered for this project.
- Some rules shall be followed when defining the operational radio laboratory footprint:
 - The radio environment have to be representative of your network (urban more or less dense, quick axes...).
 - HO 3G to 2G areas (weak 3G) should be part of the area under investigation
 - Inter RNC transitions shall be possible in this area as well.

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3G & 2G Networks Interactions: Idle

- The 2G network is used as a fallback by the 3G customers. The inter RAT reselection causes a considerable signalling load on the various elements of the network.
- Among the various elements impacting the magnitude of this phenomenon (3G coverage, parameters setting) an important element is the 3G mobile itself.
- Indeed, the performances comparison on this specific topic (measured for instance along a given road at the same time and by tracking the IMSIs) show very different results from one mobile to another one.
- Is that due to:
 - > Proprietary algorithms ?
 - > Compliancy more or less accurate to the broadcasted thresholds ?
 - > Radio performances of the mobile (sensitivity...)?
- Tests on platform is a valuable help to conduct this analysis. Whatever the causes, mobiles with poor performances cause unnecessary signalling load on the network.



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End to End Quality of Service : a reference for customer quality

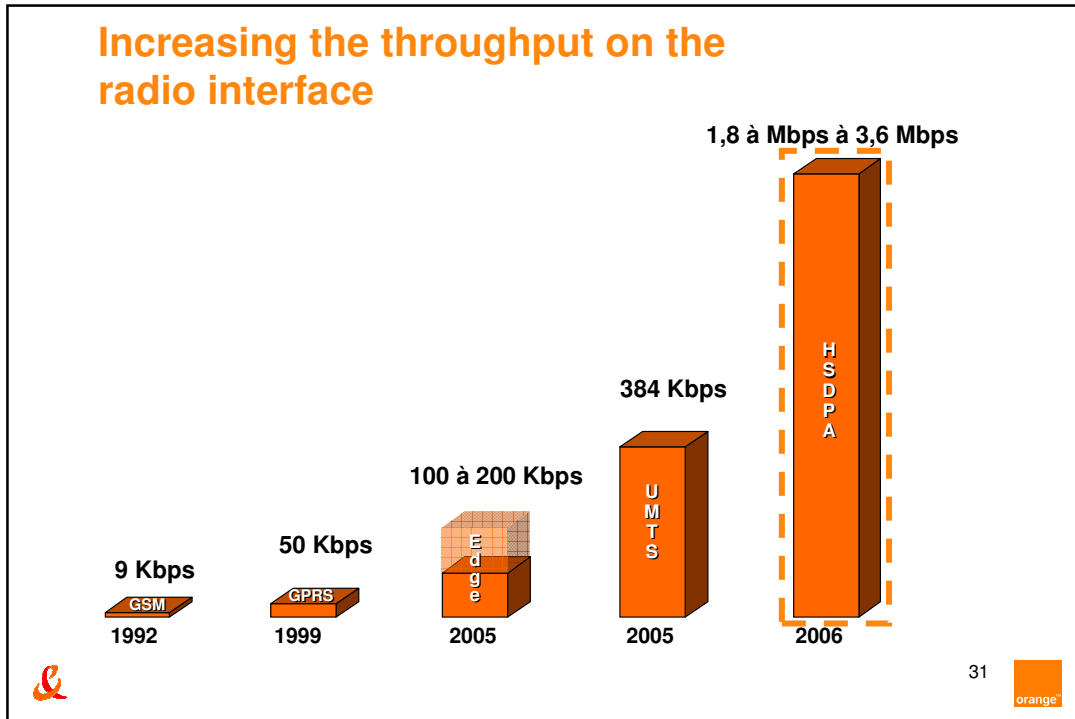
- **E2E QoS** is measured periodically by dedicated teams which have to evaluate the customer experience
- It is considered as the **main network QoS reference**
- QoS is measured for
Voice, Visio, HTTP&FTP services
With **reference terminals** (most sold and now well known): 2UEs (Mob1, Mob2) with different chipsets
- **Main analysis** done (radio + Core Network)
Drop/failures,
MOC/MTC, calls in 2G, calls with HO 3G/2G => CR, data rate,
Location, issues causes (radio, system, others)



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Moving to HSDPA



- ### Main technical characteristics of HSDPA
- HSDPA (High Speed Downlink Packet Access) specified in 3GPP R5
 - A new downlink channel is specified for HSDPA, this channel is shared between the different users
 - This sharing allows to deliver the service simultaneously to a large number of users
 - This optimises the radio resources
 - The uplink channel is Dedicated CHannel (DCH) compliant to UMTS R99
 - > 128 kb/s UL and 384 kb/s UL will be possible
 - HSDPA allows High peak rates per carrier, up to 14 Mbps theoretically
 - 1.8Mbits/s for category 12 handsets; 3.6 Mbits/s for category 6 handsets; higher throughputs will also be possible
 - The latency time is divided by two
- 32

Marketing aspects for HSDPA

- HSDPA for the consumer market
 - HSDPA will boost data usage thanks to higher speed and higher quality; the following services are being considered:
 - High speed download (video and mp3)
 - Video streaming and TV live with higher quality
 - Highly interactive games
 - High speed browsing
- HSDPA is expected to leverage the PC card market for business nomads
- HSDPA will bring a disruptive user experience on the main business usages (e-mail, intranet access) that need high speed for data
 - This is deduced from our marketing studies and we experienced that 3G launch had a major impact on Business Everywhere



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Technical issues to be tackled

- **Dedicated frequency or not**
 - To provide HSDPA on a carrier dedicated to it
 - Or
 - HSDPA and R99 traffic can be combined on a single carrier
- **R99/HSDPA handover**
 - It shall be ensured both in inter-frequency case and in intra-frequency case
- **Node B dimensioning**
 - In some cases a carrier shall be added to accommodate the HSDPA traffic
 - Base band signalling shall be increased to handle the HSDPA traffic
- **Dimensioning of two terrestrial interfaces impacted by HSDPA traffic**
 - Iub between Node B and RNC: re-dimensioning both to cope with the traffic increase and to avoid limiting the peak data rate of one user, even with low traffic volume.
 - Iu-PS between RNC and SGSN: aggregated HSDPA traffic, re-dimensioning to



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HSDPA Performance KPIs

- We will act as we did for UMTS R99, i. e. we will use some KPIs in order to guarantee that a sufficient end to end QoS is reached
- Some of these KPIs are indicated here :
 - > Access to the service
 - > Attach connection time & success rate
 - > Internet connection time (first page display, including PDP activation)
 - > Downloading time for given HTML page
 - > FTP transfer in DL
 - > Latency
 - > UL transfer in 384kbps
 - > ...



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Field Trials with our three manufacturers

- Orange Group presently perform tests with their three UTRAN manufacturers
- Purposes of these tests :
 - To check the actual performances of the HSDPA technology (coverage, throughputs)
 - To qualify the compliance and stability of the equipments and software provided by the manufacturers
- Some tests have been performed in our labs, we are now performing field tests
- The tests plan of the field trials comprises the following items
 - Coverage
 - Throughputs at the borders of the coverage area
 - Number of simultaneous users in real conditions
 - Actual HSDPA performances in different radio conditions
 - Efficiency of the algorithms used to handle the radio resources
 - Tests shall be performed both in static and in mobility conditions
 - Both HSDPA/HSDPA mobility and HSDPA/R99 mobility shall be tested
- In addition the field trials will allow to optimise the parameters setting in actual radio conditions




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More than 200 friendly customers are testing HSDPA with Orange



1


Tests in LYON :
More than 100 users
In cooperation with :









2


Tests in Boulogne / Issy-les-Moulineaux :
More than 100 users
In cooperation with :



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The HSDPA PC-cards

Lyon	Boulogne - Issy les Mix
   <p>USIM Orange</p> <p>PC Card Sierra Wireless AirCard® 850</p>	   <p>USIM Orange</p> <p>PC Card Novatel Merlin U740</p>

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Main milestones until the HSDPA commercial launch

- Completion of the three HSDPA field trials
- Roll out of Hardware elements to increase the capacity
 - The existing Hardware (Node B and RNCs) is compatible with HSDPA, this allows to perform smoothly the capacity increases (Node B, RNC, fixed lines) needed for HSDPA
- Validation of the commercial software provided by the UTRAN manufacturers
- Roll out of the commercial software
- Check of the performance KPIs
- Commercial launch in 2006

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