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FWA-IP UMTS-WCDMA
TERMINAL ARCHITECTURE

BRIEF ANALYSIS AND SOLUTIONS

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1 INTRODUCTION

Third generation mobile radio networks have been under research and will emerge around the year 2000. IMT-2000 will provide a multitude of services, especially multimedia and high bit rate packed data [3].
On the other hand, Internet world is already well known and many people often use it for lot of purposes.
Actually, wired access is a common way to be connected to Internet but, in the next future, wireless IP access will be probably one of the easier way to do it.
Possible architectures of FWA-IP terminals based on UMTS-WCDMA is the subject treated on this document. Some alternatives will be analyzed in terms of features and drawbacks. From the network point of view, some further considerations about radio resources, coverage and terminal installation will be treated as well.

2 GENERAL

2.1 Scope

The scope of this document is to show an overview of possible FWA-IP UMTS-WCDMA terminal architectures for terrestrial applications and to estimate their advantages and disadvantages in terms of features, complexity and costs, in general.

It should therefore be emphasized that subjects treated on this document are not to be considered as a reference for development.
It contains, only, a very rough feasibility analysis and some technical comments concerning FWA-IP terminal architectures.

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2.2 Background

The term FWA-IP indicates a system which allows wireless connections between Internet users and the global IP network.
For third generation mobile system (IMT-2000) WCDMA technology will be used. The mobile air interface has been already optimized for high bit rate packed data and, for this reason, it can be useful for FWA-IP applications. However, about IP over UMTS many issues are still open up to now.

2.3 Abbreviations

ARIB	Association of Radio Industries and Businesses
ASIC	Application Specific Integrated Circuit
BER	Bit Error Ratio
BTS	Base Station
CDMA	Code Division Multiple Access
CPU	Central Processing Unit
DMA	Direct Memory Access
DP	Device Processor
DSP	Digital Signal Processor
ERP	Effective Radiated Power
ETSI	European Telecommunication Standard Institute
FDD	Frequency Domain Duplex
FER	Frame Error Ratio
FWA	Fixed Wireless Access
HEMT	High Electron Mobility Transistor
IMT-2000	International Mobile Telecommunications-2000
IP	Internet Protocol
ITU	International Communication Union
LLC	Logical Link Control
LNA	Low Noise Amplifier
MAC	Medium Access Control
MMIC	Monolitic Microwave Integrated Circuit
OS	Operating System (DP)
PIB	Power and Interconnections Box
RAM	Random Access Memory
RISC	Reduced Instructions Set CPU
RLC	Radio Link Control
RSSI	Radio Signal Strength Indicator
TCP	Transmission Control Protocol
TDD	Time Domain Duplex
UDP	User Datagram Protocol
UMTS	Universal Mobile Telecommunication System
UTRAN	UMTS Terrestrial Radio Access Network
WER	Word Error Ratio
WCDMA	Wideband CDMA

3 FWA-IP SCENARIO

Fig.1 shows a possible scenario of a simple FWA-IP user environment. The user terminal (Personal Computer or Workstation) is connected to FWA-IP terminal through a standard ethernet cable. In the other side, FWA-IP terminal is connected to the IP fixed network through a radio link (UMTS-WCDMA), a BTS and some other network elements.

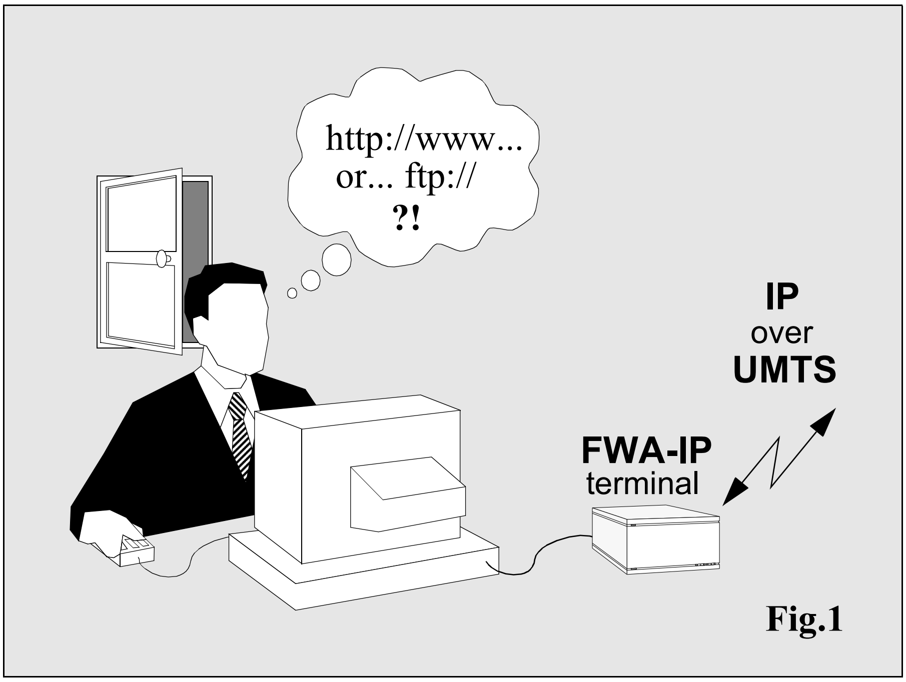

Fig.1

An FWA-IP terminal can be represented by a single box, as shown in fig.1, but it could be implemented by one, two or more different phisical boxes, connected together by cables. Obviously, one box solution seems to be the right choice, because surely it has lower costs and it will be easier to install but, on the other hand, it has some drawbacks, which are described below.

3.1 Basic requirements for terminals

Basic requirements for terminals can be divided as follows [11]:

- Cost sensitivity
- Performance
- Other issues

Normally, **the first two requirements are in conflict between them** and a trade-off has to be considered to find the right balance to avoid high cost of infrastructure that could result for a terminal performance reduction. To have *low cost* terminals some indications are listed below:

- Indoor easy installation
- Low power consumption
- Minimal complexity
- Cost efficient radio part and antenna
- Possibility to upgrade SW over air interface
- Reduced field support

To guarantee terminal *performances* some indications are listed below:

- Location outdoor at high position
- High transmitter output power
- High receiver sensitivity
- High gain antennas

About *other issues* some requirements are listed below:

- Flexibility to add country/customer specific interfaces and features
- Design has to be as invisible/decorative as possible
- Robustness toward stress (mechanic, climatic and electric)

3.2 Functional blocks description

Fig.2 shows the functional blocks of a generic FWA-IP terminal.
The three main blocks are: the air UMTS transceiver, the IP cell assembler/disassembler and the ethernet controller. The last block includes the ethernet transceiver functionality. Another functional block (optional) is the user interface which can be useful to indicate some informations not supported by IP service.

3.2.1 Ethernet transceiver

This sub-functional block is necessary to connect the ethernet physical link from the IP user terminal to the FWA-IP device processor (DP). For this purpose, a standard 10-base-T transceiver can be used.

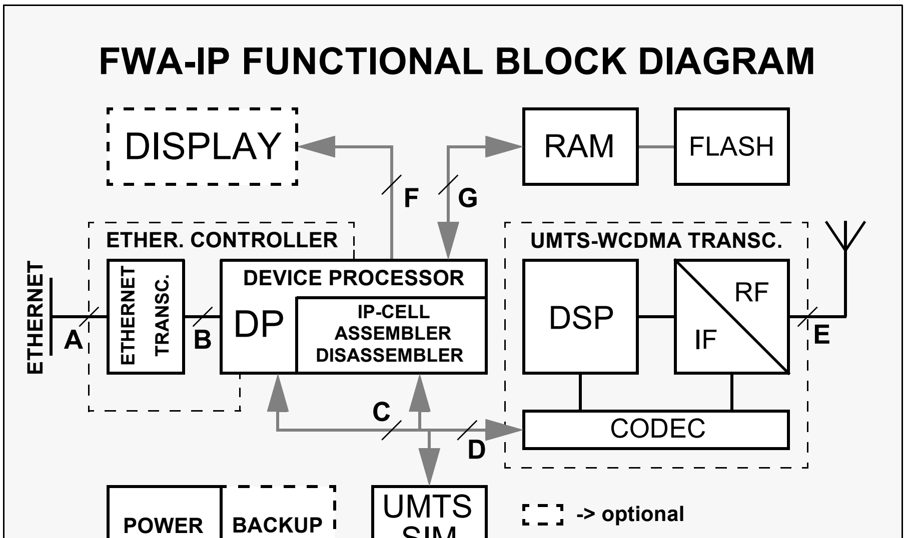

Fig.2

3.2.2 Ethernet controller

The high level ethernet link controller is a standard function commonly implemented into the DP. This functional block is necessary to extract (uplink) and to map (downlink) IP cells into ethernet protocol (further evaluations about TCP and/or UDP are out of the scope of this document).

The interface, between ethernet transceiver and DP, is not already defined; for this reason, to simplify the DP firmware and the hardware implementation and for HW/FW compatibility reasons, the manufacturer choice of the ethernet transceiver probably will be a consequence of the DP manufacturer choice.

3.2.3 IP cell assembler-disassembler

This function will be executed by the DP of the FWA-IP terminal.
Actually there are no standardization about the IP mapping over UMTS. This means the cell mapping strategy probably will be one of the most critical design issue in terms of delivery time. Moreover, the quality of IP service over UMTS (e.g. BER and FER tolerance, uplink and downlink traffic balancing, FDD or TDD mode, etc.) shall not be neglected.

It determines the DP-HW processing performance required for FWA-IP terminals. Probably, they are completely different from those of UMTS mobile phones and, if this is the truth, the DP will be different as well.

However, because of the complexity to handle IP over LLC and MAC UMTS layers in full asynchronous mode, SW tasks, HW drivers and DMA controller should be supported by a real time OS.

3.2.4 UMTS-WCDMA transceiver

The UMTS-WCDMA transceiver is divided in three sub-functional blocks: the baseband processor, the radio transceiver and the codec.

The baseband processor can be implemented by using a DSP. The transmission section is used for spreading, scrambling and pulse shaping of the I and Q modulation signals. Moreover, it contains the TX output power regulation algorithm. The receiver section contains the RAKE type receiver (coherent reception in both channel impulse response estimation) and the code tracking procedures.

The WCDMA radio transceiver contains: the transmitter and receiver chains [2]. Depending on the domain transmission mode (TDD or FDD) and the frequency band adopted (2 GHz or 3.5 GHz), the radio transceiver architecture will be completely different.

The codec sub-functional block contains the digital control interfaces between DP and DSP, the AD/DA baseband converters and the decoder drivers for radio interface.

3.2.5 User interface

The user interface (optional) can be used to give some further informations to the user, which are not supported by IP service (e.g. RSSI indicator, UMTS link status, etc.), but needed for the terminal installation and for its maintenance.
This interface can be implemented by using a simple LCD. In alternative, a SW utility can be installed to the user terminal in order to show all informations through the video.

Figure 2 shows, also, the electrical interfaces between the main functional blocks. Most of them are digital (the internal signals, B, C, D, F and G). A ad E are electrical analog signals (E is the air interface).

4 TERMINAL ARCHITECTURES

Some possible alternatives of FWA-IP terminal will be described below All of them can be applied for 2 GHz and 3.5 GHz bands; the first four are indoor solutions and the fifth is outdoor.

Furthermore, to describe a complete overview of opportunities features and drawbacks will be analyzed.

4.1 Alternative 1: desktop with integrated antenna

This alternative is also called *one box solution*; everything is integrated into a single box, antenna(s) included; the connection between the FWA-IP terminal and the user terminal is performed by few meters of ethernet cable. Figure 1 shows the possible scenario of this alternative.

4.1.1 Features and drawbacks

Features of alternative 1 are listed below.

- Desktop FWA-IP terminal with integrated antenna(s) has probably the lowest costs with respect to the other alternatives.
- The installation is very simple. The IP user is able to install the terminal by himself, without field support.

Drawbacks of alternative 1 are listed below.

- Lowest coverage of terminals due to building penetration loss (20 dB is estimated at 3.5 GHz). This will impact the costs of infrastructure (number of BTS per area) [13].
- Six dB more of RF margins are needed due to body loss and to log normal fading [13]. To compensate partially the radio link performance degradation, terminal antenna diversity is required, although this will impact on the radio interface complexity.
- Directional antenna(s) are not recommended for this solution and, consequently, the antenna gain will be negligible.
- Efficiency of radio link depends on the terminal position, from the existing furniture and from the room morphology.
- Indoor irradiation cannot be avoided.

4.2 Alternative 2: desktop with external passive antenna

This alternative is similar to the previous one. It consists of a desktop solution with an external passive antenna which is connected to the main box by using a short coax cable (2 or 3 meters). The idea is to have the possibility to place and to orient antenna in order to optimize the radio signal strength during installation.

4.2.1 Features and drawbacks

Features of alternative 2 are listed below.

- Desktop FWA-IP terminal with external passive antenna has low costs, slightly more than alternative1 because of the additional costs of antenna, cable and connectors.
- The installation is simple. The IP user is able to install the terminal by himself, without field support.
- Building penetration loss can be reduced due to the flexibility to place and to orient antenna.
- Directional antenna can reduce indoor irradiation and compensate partially the cable loss.

Drawbacks of alternative 2 are listed below.

- Terminal antenna diversity concept is not applicable.
- High TX/RX branching isolation required for FDD (only one antenna).
- Reduced antenna cable length to avoid excessive loss compared with antenna gain.

4.3 Alternative 3: desktop with external active antenna

There are two possible solutions of active antenna but the concept of trying to increase the radio link performance is the same for both. The first consists of a radio transceiver booster located close to the antenna. The second consists of an up/down frequency converters located close to the antenna as well. In any case, the connection between active antenna and IP terminal is performed by using a coax cable. There are some differences between them in terms of costs and HW complexity, but they have two main drawbacks, described below, regarding antenna power and controls.

4.3.1 Features and drawbacks

Features of alternative 3 are listed below.

- The installation is simple. The IP user is able to install the terminal by himself, without field support.
- Building penetration loss can be reduced due to the flexibility to place and to orient antenna.
- Directional active antenna can reduce indoor irradiation and compensate the cable loss.

Drawbacks of alternative 3 are listed below.

- The antenna needs power supply. This means that either DC current shall flow through the coax cable or an additional power cable is needed.
- The antenna needs controls (e.g. RF output power). This means that either controls shall flow through the coax cable or an additional control cable is needed.

4.4 Alternative 4: window intergrated antenna solution

This alternative is also called *two boxes solution*; one of them contains all electronic parts, antenna included, and shall be installed on glass. The other (PIB Power and Interconnection Box) contains the power supply (backup if needed) and the ethernet connections. Fig.3 shows the scenario of FWA-IP terminal on glass.

4.4.1 Features and drawbacks

Features of alternative 4 are listed below.

- Best indoor alternative for coverage. Building penetration loss is strongly reduced.
- No coax cable needed between the two box. Only an eight poles flat cable and very low cost connectors are required.
- Minimum indoor irradiation.
- Possibility of antenna diversity (space or polarization).
- The IP user is able to install the terminal by himself, without field support.

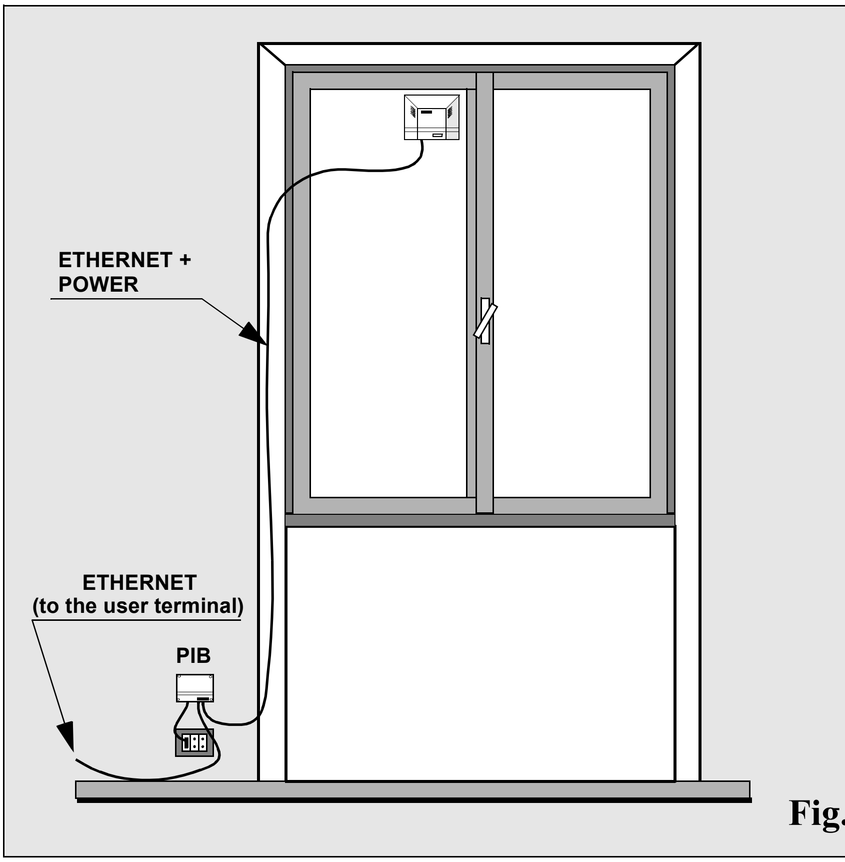

Fig.3

Drawbacks of alternative 4 are listed below.

- No possible installation in room without windows.
- Installation visible and, probably, not decorative.
- The antenna path depends from the installation and it will changes if the window is closed or not.

4.5 Alternative 5: rooftop solution

It consists of two boxes; the first is located outdoor, on the rooftop, which includes the antenna and the up/down frequency converters. The second is located indoor and it contains the rest of electronic parts.

The two boxes are connected together by a coax cable. The user terminal is connected to the indoor part through a standard ethernet cable.

4.5.1 Features and drawbacks

Features of alternative 5 are listed below.

- Best alternative for coverage. Building penetration loss is avoided.
- No indoor irradiation.
- Possibility of antenna diversity (space or polarization).

Drawbacks of alternative 5 are listed below.

- Highest costs with respect to the other alternatives due to the long cable needed and for the outdoor performance required (extended range of temperature, humidity, etc.).
- The outdoor unit needs power supply. This means that DC current shall flow through the coax cable.
- The outdoor unit needs controls (e.g. RF output power). This means that controls shall flow through the coax cable.
- The IP user is not able to install the terminal by himself.
- Installation visible and, probably, not decorative.

5 ENVIRONMENT CONSIDERATIONS

5.1 Available radio resources

Radio resources allocation for third generation mobile radio network have been already decided by ETSI [1], but there aren't any decision about FWA-IP, up to now. Two main alternatives will be analyzed in the following sub-sections: the first one is to use the same mobile bands at 2 GHz; the second one is to use the free band at 3.5 GHz.

5.1.1 2 GHz band

Figure 4 shows the allocation of radio resources for third generation mobiles network at 2 GHz. There are two bands allocated in Europe for Wideband CDMA (paired band FDD), each one of 60 MHz with duplex distance between two bands of 190 MHz [3]. Large value of duplex distance is necessary for FDD to guarantee more of 80 dB of isolation between TX and RX chains of the radio transceiver [6]. For TDD terrestrial applications two non paired bands are allocated. The first band is of 20 MHz bandwidth (1900-1920 MHz) and the other one is of 15 MHz bandwidth (2010-2025 MHz).

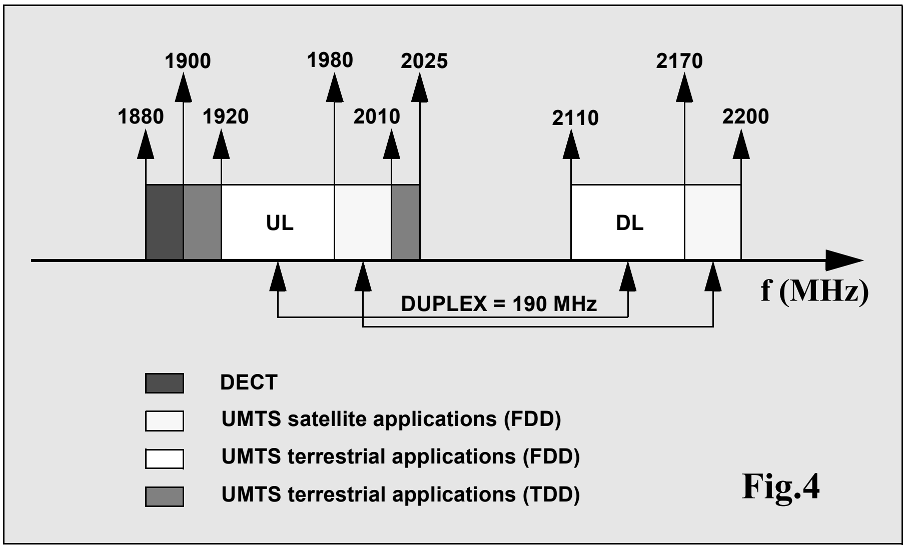

Fig.4

5.1.2 3.5 GHz band

Figure 5a shows the available band at 3.5 GHz for FWA services [14]. Actually, there are no standardization about radio interface technology allocations and their duplex domain. A possible FDD/TDD frequency allocations is showed on figure 5b.

Note: **figure 5b shows only an example of possible frequency mapping at 3.5 GHz and it has not to be considered as a reference for development.**

Actually, by using the same filter technology commonly used at 2 GHz, the existing available band at 3.5 GHz is not enough large to guarantee required duplex isolation for FDD applications.
However, by removing the satellite application and by reducing of 1/3 the bandwidth allocation for FDD and TDD, the available duplex space would come reduced of 30 MHz only (from 190 MHz at 2 GHz to 160 MHz at 3.5 GHz). Even though 160 MHz of duplex space could be enough large for 3.5 GHz BTS duplex branching, in any case, filters technology for terminals at 3.5 GHz couldn't fulfill the TX/RX isolation required [6].

The limited rejection performance is not dependent from the Q factor of filters, but is mainly due to the reduced mechanical dimensions and to the absence of efficacious shielding between pads.
Four pole duplex filters can guarantee, only 45-50 dB of isolation between TX and RX chains and this will reduce dramatically the linear dynamic range of the receiver front-end.

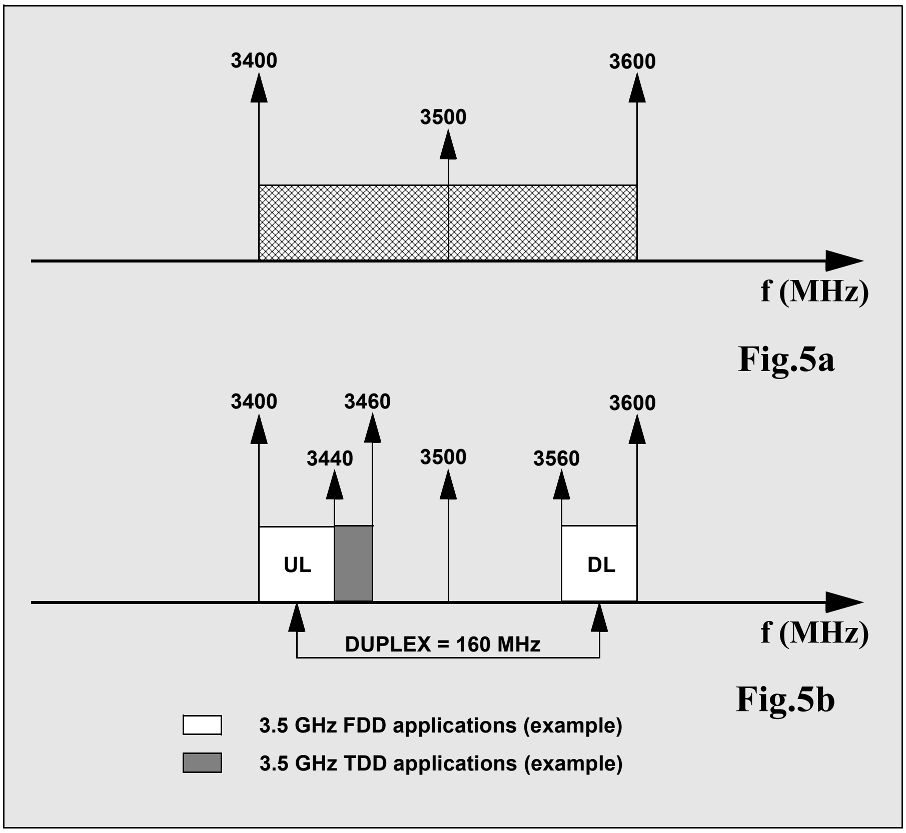

Fig.5a

Fig.5b

In any case, this will be one of the most critical point for FDD terminals implementation at 3.5 GHz even though the duplex space will be widen in the future (3.4 - 3.8 GHz is planned in Canada) [14].
However, there are some strategies to solve partially this problem, one of them is to use different antenna polarization for uplink and for downlink.

About WCDMA-TDD applications at 3.5 GHz features and drawbacks are substantially the same of those of UMTS band.

6 FEASIBILITY CONSIDERATIONS

6.1 Impacts due to the RF band used

6.1.1 Coverage

The generic path loss calculation is described as follows:

$$A_p = 20 \cdot \log 4\pi + 20 \cdot \log \frac{D(m)}{\lambda(m)} \quad (1)$$

where 4π is the solid angle, *D(m)* is the distance and $\lambda(m)$ is the wave-length. Then, the difference between 2 GHz and 3.5 GHz path loss can be easily calculated:

$$\Delta A_p = A_{p1} - A_{p2} = \left(20 \cdot \log 4\pi + 20 \cdot \log \frac{D}{\lambda_1}\right) - \left(20 \cdot \log 4\pi + 20 \cdot \log \frac{D}{\lambda_2}\right) \quad (2)$$

$$\Delta A_p(dB) = 20 \cdot \log \frac{\lambda_1}{\lambda_2} = 20 \cdot \log \frac{f_1}{f_2} = 20 \cdot \log \frac{3500}{2000} \cong 4{,}86 dB \quad (3)$$

This means that FWA services at 3.5 GHz will have 4.86 dB more of path loss, at equal distance, with respect to FWA services at 2 GHz.
The path loss difference between bands implies different coverage area. Then, the ratio between 3.5 GHz and 2 GHz coverage limits, over free space, can be expressed by:

$$\Delta D_f = D_{f1} - D_{f2} = 10^{-\Delta A_p(dB)/20} = 10^{-4{,}86/20} \cong 0{,}571 \quad (4)$$

Then, with same ERP, the coverage limits at 3.5 GHz will be reduced of about 43% with respect to the coverage at 2 GHz.
However, one way to compensate this difference is to increase the an-tenna gain of terminals and/or reducing body/building loss [13].
More informations about fading, scattering and interference margins needed at 3.5 GHz for urban, suburban and open environments are available in [13].

6.1.2 Technology

Actually there are no chip-set available for FWA-IP applications based on UMTS-WCDMA. Only generic components are available and, for this reason, the following estimations about digital parts are focused on them.

About radio interface at 2 GHz frequency operations, UMTS mobile solutions probably will be available soon, because some semiconductor companies are already developing their components for 3G mobile phones. Silicium-Germanium technology (SiGe) has low costs and high performance at 2 GHz. Unfortunately, at 3.5 GHz this technology has relevant degradation of noise figure, so it is not indicated for LNAs.

AlGaAs/InGaAs components (discrete and MMIC) has very good performance at 3.5 GHz but they are more expensive. Pseudomorphic HEMT are designed for high linearity as well and probably they are the best choice for WCDMA front-end of receivers.

On the last year, Celeritek has distributed samples of a low cost WCDMA power amplifier which guarantee 30 dBm of linear output power. Siemens has a complete solution for CDMA applications at 3.5 GHz and it seems to be good, also, for WCDMA, but its cost for volumes is comparable with cost of solutions with discrete components.

A further rough estimation of costs is reported below.

6.1.3 Costs

Digital parts costs analysis is described on section 6.3.
Assuming that technology of radio interface of terminals for FWA-IP applications will follows the 3G mobile terminals technology at 2 GHz, there are no relevant impacts on costs of radio transceiver.
For operations at 3.5 GHz the terminal costs will be higher because of the change of technology. About 80% of additional cost shall be considered for radio interface because of the different substrate needed (BT-epoxy instead of FR4 fiber glass) and for the higher costs of passive and active components required.
About antenna cost, it depends from the terminal architecture choice, from the band adopted and from the antenna gain required to fulfill system performance.

6.2 Impacts due to the duplex domain adopted

TDD mode has the following *advantages* with respect to FDD [5].

- **Open loop power control**. Fast uplink power control may be implemented in the terminal. In the downlink only slow power control can be applied
- **Base station transmit antenna selection**. Due to the high correlation of forward and reverse path the FWA-IP terminal antenna diversity (needed for indoor FDD) can be moved to the base station (less interference, more system capacity)
- **Pre-RAKE combining diversity**. In a TDD system, the RAKE combining can be carried out in the base station, also for downlink
- **Adaptive antennas**. Channel estimation of the uplink facilitates an efficient implementation of adaptive antennas for the downlink
- **Two RX-IF sections can be avoided**. For inter-frequency handover two IF sections are needed when slotted mode is not used (high bit rate) [6]
- **Duplex filter for terminals is not needed**

TDD mode has the following *disadvantages* with respect to FDD

- **More accuracy on synchronization**. All BTS must be synchronized between them to guarantee more air frame timing accuracy
- **Same radio resources are shared by up and downlink**. This could impact on system performance

So, in one hand TDD mode simplify the terminal architecture and reduce its cost; on the other hand it complicates the infrastructure because of the more accuracy on synchronization required.

6.3 Digital part proposals (S. Restivo I. Bocci)

6.3.1 Device Processor (DP)

The current chapter describes three different DP proposals for FWA-IP terminals. For all of them there are few common components:

- Power supply
- Crystal oscillator
- Dynamic RAM (16 MBytes are estimated)
- Flash (4 MBytes are estimated including the software download utility)
- USIM card interface
- LCD user interface (optional)

PROPOSAL N.1

This proposal is based on IBM microprocessor Power PC750 which is an implementation of the Power PC family. It provides 32 bit effective addresses, integer data types of 8, 16, and 32 bits, and floating point data types of 32 and 64 bits. It is a RISC microprocessor and it has very high efficiency and high throughput since it is able to execute several instructions in parallel. The real time operating system that can be used is OSE Delta.

Figure 6 shows a specific HW architecture for *Proposal N.1*.

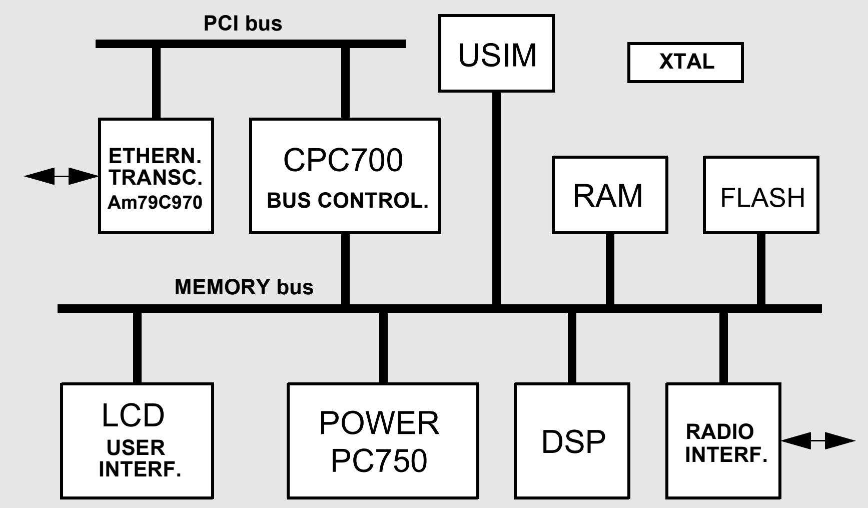

Fig.6

PROPOSAL N.2

The proposal N.2 is another architecture that uses an IBM ASIC which includes the Power PC405 core (a new addition to the 32 bit RISC Power PC processor family) and an ethernet interface. It has very high performance at low cost and at low power. This proposal has to be considered for the next future, since this component will not be available before the 2Q99.

Figure 7 shows a specific HW architecture for *Proposal N.2*.

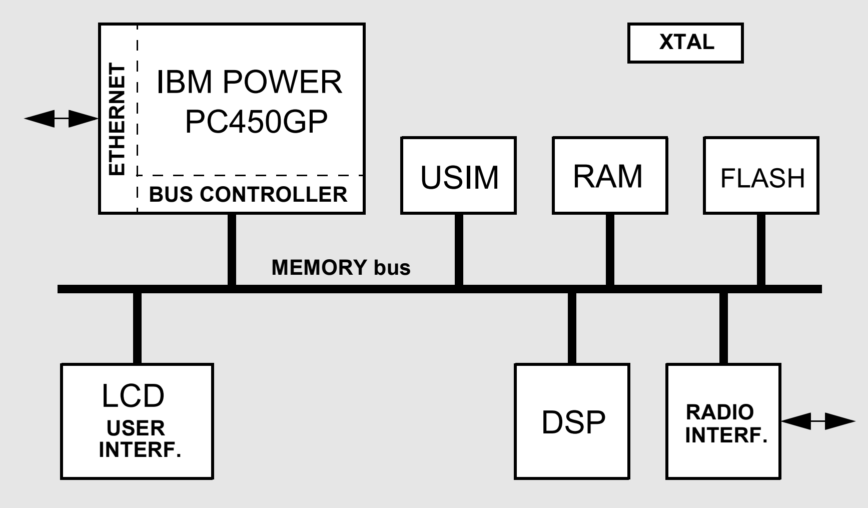

Fig.7

PROPOSAL N.3

The proposal N.3 is based on the ARM microprocessor, in particular the NET+ARM chip which provides all the hardware needed for network connection except the Ethernet Physical Interface (which will be included in the next version). It was designed for network application.
In the following there is a list of the main components contained into NET+ARM chip.

- ARM 7T RISC processor
- 10/100 Ethernet MAC (supports 10-base-T or 100-base-T)
- Memory bus Controller inside chip
- 10 DMA channels
- Two RS-232 serial ports
- IEEE-1284 parallel port
- Watchdog timer

Rtos Psos licence, protocols licence and the firmware for network applications (ethernet/internet) are also included.

Figure 8 shows a specific HW architecture for *Proposal N.3*.

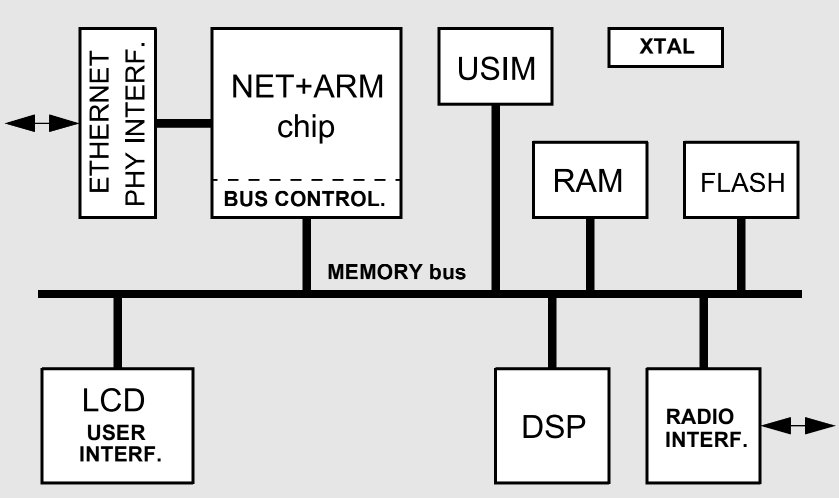

Fig.8

Proposal N.3 seems to be the best choice because the Net+Arm is designed to operate with Network protocols, so it is possible to develop the product better, faster and at lower cost. PowerPC405 has been designed to work on ethernet as well, but it is not available yet.
Proposal N.1 has the disadvantage to be more expensive because of several components are needed to satisfy each functionality.

6.3.2 Digital Signal Processor (DSP)

Two different solutions have been considered. Both alternatives are based on TI fixed-point DSPs; the first one on the TMS320VC510, and the other on the TMS320VC549. The following table lists and compares the characteristics of the two DSPs.

Table 1: DSP Characteristics

Parameter	TMS320VC549	TMS320VC5410
Power Supply	3.3V I/O and 2.5V Core	
Frequency	100MHz	
MIPS	100	
CPU cycle time	10ns	
On-chip Ram	32K x 16bit	64K x 16bit
On-chip Rom	16K x 16bit	
Peripherals	Two buffered serial ports	Three multichannel buffered serial ports
	Standard 8-bit HPI	Enhanced 8-bit HPI
		DMA Controller
	Programmable PLL	
Price for volumes	120 SEK	170 SEK

In terms of speed, as shown in table 1, both devices have the same behavior; this CPU speed has been considered enough to cover all of the requested amount of computation and gives also the possibility to increase the algorithm load, if needed in the future.

The presence, in the 'VC5410, of the Enhanced HPI and DMA Controller allows easier implementation of interfaces towards the DP and the Radio Part. Moreover the bigger on-chip RAM (64KW vs. 32KW) is another advantage of the 'VC5410; in fact due to the less amount of memory in the 'VC549, there could be the need of an external memory, which will lead on one hand to an increase in costs and power dissipation, and on the other hand to a decrease in speed.

The 'VC549 looks to cost a little less but there’s still to be considered the price of the external memory that must be probably add. On the other hand the price of the 'VC5410 is not to be considered reliable, because the device will be released by TI at the end of 2Q99.

After all these considerations, it may be said that, even if the devices are very similar, the best choice should be the TMS320VC5410.

Table 2 shows the cost estimation of digital components for FWA-IP terminals based on UMTS.

Table 2: Digital part cost estimation

Proposal	DP and peripherals	DSP	Total
1	1600 SEK	120-170 SEK	1720-1770 SEK
2	640 SEK	120-170 SEK	760-810 SEK
3	660 SEK	120-170 SEK	780-830 SEK

6.4 Terminal power backup

Power backup for terminals implies battery and its charger. The battery operating time depends from its charge capacity and the power requirements of terminals. However, to reduce their costs, power backup could be avoided because, normally, user terminals are fixed. In any case, for semi-fixed usage, battery power backup for FWA-IP terminals could be sold as an option.

6.5 Utility and maintenance

Two main utilities are listed below.

- To give to the user the possibility to download and to install by himself the new software releases of FWA-IP terminal directly through Internet
- To give to the user some further informations, which are not supported by IP service, but needed for installation and maintenance (e.g. RSSI indicator, radio link availability, USIM status, etc.)

These user utilities are focused, also, to reduce field support and for an easier maintenance of terminals.

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