Chapter 73
Broadcast Quality Video Contribution in Mobility

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ABSTRACT

The continuous growth of the available throughput, specially in the uplink of mobile phone networks is opening the doors to new services and business opportunities without references in the past. In more concrete, new standards HSDPA/HSUPA, introduced to complement and enhance 3G networks, together with the advances in audio and specially video coding, like those adopted by the standard H.264 AVC have boosted the appearance of a new service: exploiting the mobile telephony networks for contributing broadcast quality videos. This new service is offering just now a low cost, high flexibility alternative that, in a brief period of time, will substitute the current Electronic News Gathering (ENG) Units, giving rise to what is being to be called Wireless Journalism (WENG[1] or WiNG[2]). This chapter discusses both the technologies involved and the business opportunities offered by this sector. Once reviewed the state of the art, different solutions will be compared, some of them recently appeared as commercial solutions, like QuickLink 3.5G Live Encoder[3] or AirNow![4] and others still in research and development processes.

INTRODUCTION

As the different mobile technologies evolve towards an all-IP schema, the throughput increases in both directions, uplink and downlink. Whereas the business opportunities for the downlink are fairly clear (e.g. low-latency browsing, music and video streaming, etc...), the potential use for the uplink remains unsolved. In this scenario, different carriers have taken the Internet as a model, and encourage the use of the uplink in means of adding user-generated content to social networks. However, this use does not justify the need for a high throughput rate. This is why mobile operators are focusing on finding a killer application that will make profitable the huge investments in updating their networks. As stated before, user-generated content does not justify the need for a

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high throughput, so the killer application must be searched among the most bandwidth-consuming services.

Considering the huge amount of information available in a single image, digital video signals can be considered one of the most bitrate-intensive digital signals, which makes video transmission one of the possible killer services that will bring profit to the carriers' uplink. However, not all mobile terminals are able to deal with high quality video nor every user considers video uploading a priority. These two factors lead to search a more specialized user profile, such as TV producers and broadcasters, who may find in the latest mobile technologies a perfect complement for they current transmission methods.

Field production and electronic news gathering is a common practice in TV programming, especially for news bulletins and programs alike. Two different approaches are used for these issues: ENG (Electronic News Gathering) and EFP (Electronic Field Production).

Most times, ENG resources consist on simple video shooting which will be later edited and included in news bulletins, documentaries, interviews, etc. When live information is needed, but a full mobile unit is not required nor justified, a light mobile unit with satellite or microwave connectivity can be used. Choosing one of the two links depends on propagation conditions and/or visibility restrictions.

In cases when a live, long, real time edited, transmission is needed the only available option nowadays is to set up a full mobile unit, which include almost all the features of a TV production studio. Again, microwave or satellite links are needed to send the information.

Apparently, TV production needs for video transmission meet the requirements of the bitrate-intensive service searched by carriers in order to solve the underdevelopement of uplink services and associate business opportunities.

KEY FACTORS IN THE EVOLUTION OF MOBILE NETWORKS UP TO HSUPA AND BEYOND

Limitations of first and second generation mobile telephony standards produced that the Third Generation Partnership Project (3GPP), which includes hardware manufacturers and telephony operators, started developing a new mobile telecommunications system, called Universal Mobile Telecommunications System (UMTS) or 3G. The objective was to develop a mobile telephony system that was not limited to a certain region or country. Besides, it should improve the efficiency of previous standards like GSM (Global System for Mobile communications) and provide better packet-based services.

One of the reasons why these improvements could be achieved is the new radio access schema proposed for these UMTS networks, WCDMA (Wideband Code Division Multiple Access), which works better than Time Division Multiple Access (TDMA) under certain conditions and provides higher efficiency for packet transmission mode.

WCDMA technology uses a Spread Spectrum technique whose main principle is shown in figure 1. The data signal is multiplied by a user-specific pseudo-noise code, spreading the signal throughout the whole band. The receptor extracts the data signal using the same code, as shown in Figures 2 and 3.

The Universal Mobile Telecommunications System, released in 1999, provided throughputs of up to 384 Kbps in packet mode for the downlink and 128 Kbps for the uplink, which compared to previous mobile telephony standards like GSM meant an increase of nearly three times.

One of the most important revisions was the release 05, also called HSDPA, which focused on improving the downlink channel for packet transmission, boosting the maximum throughput up to 7.2 Mbps. These improvements were later

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