XGP Handbook 2nd Edition v16.0
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Transformation of Telecom Paradigm on the Way

Mr. Alvin Toffler is a well-known futurologist for his ability to foresee things to be happened in future precisely. People who can draw the future picture of a society precisely are extremely few in the world. But as people of this kind do exist, we can't help wondering if it is really supernatural to foresee the future, or could it be an intelligence that could be developed from immeasurable everyday learning. If so, it would be important for us to develop our natural intelligence and great determination, in order to foresee the change in future.

There are various hypotheses concerning the distinction of dinosaurs. One of them assumed that dinosaurs failed to adapt to the change of natural environment. Even these frightening unbeaten beasts in Spearburg's movie are in no peer with environment.
This is the rule of survival not only for a species, but also for a nation. Strong nations in the history shared one thing in common that they all foresaw and prepared for future it in the right way. It is always not the deposit of natural resource, but the capable leader with wisdom and determination and diligent citizens who guide a nation to prosperity.

The interesting fact is that Middle East, India and especially China, the countries and areas which were once the cradle for the civilization, are again taking the lead in the worldwide development nowadays.

The same thing happens in business field. How many companies that Forbes announced to be on Top 500 List are still on the list today? Companies involved in fiber and petrochemical businesses used to be considered the best work place back in 1960's, which one could see very few trace today. For a person from that age, the prospect of companies like Microsoft and Google could be unimaginable.

Everyone knows Company I. The company used to face one huge crisis after building a business kingdom that relied too much on Microsoft and Intel. But a remarkable leap was accomplished as the decision was made to sell its biggest business unit, PC manufacturing department. What a surprising determination of the management to sell the division making a lot of profit today.

The sales income was injected into R&D department to improve company I's own ability to develop products, which led to its current prosperity. In the future, products that have already become commodity will be considered to curve out, while business focus will be transferred to state-of-art technologies which have potential in future, such as solar power, agriculture, medical, and new energy. It is certainly prepared to invest huge capital into R&D to this regard.

The way this company is operated and the way to the brand is built must have provided us a lot to learn, such as the spirit to throw the past away without regret, to exert group wisdom and diligence, and to stand at the forefront of the society. Despite of the fact, nobody could predict how long would Company I's prosperity last.

It doesn't matter which company this is, business will be doomed as long as the company has lost its ability to foresee the future and to adjust flexibly accordingly.

Company A, which once ruled the telecom technology in the world, sold its mobile development section based on a consulting company's analysis report that predicted a small market demand of mobile phone. It had to spend huge money to purchase the section back on acknowledging the fact later.

Technology caused the change of paradigm. Even a famous company can make horrible mistakes in time of change. Now, the market is presenting BWA (Broadband Wireless Access), which could lead to another round of change of paradigm.

The conventional mobile company carries out original service, works with vendors on original terminals, and identifies itself from competing companies to create a better ARPU in a closed world. But is this strategy to work in future, considering the fact that the basis of the business model is facing challenge from open system and IP network?

When vendors and carriers that have many top engineers are excited about LTE, paradigm has shifted quietly. Telecom fare is dropping limitlessly close to free of charge, and one day in future, telecom carriers could suffer the same fate like fiber and petrochemical industries today.

The company who realized this problem earlier could avoid the fate. In this case, the

winner is more likely to be the BWA, which is congenial to optical fiber. We assert the technology would be ending up to XGP (eXtended Global Platform).

Different from WiMax, another BWA technology, which was developed in hope to combine WiFi with mobile phone, XGP is evolved from cordless phone. Advocated by Intel and its alliance, WiMax service is based on cells with much longer radium than WiFi, while development of XGP is initiated as a home-based cordless phone that can function normally in high-speed movement. Both being called BWA, the development concept of the two systems is effectively different.

Despite, since both systems will be based on OFDMA technology, some component designed for WiMax can be adopted by XGP as well. In a word, XGP is the existing improved type of the current WiMAX, which is working hard on improvement, and considering that WiMax is a recommended BWA, XGP would be the second generation BWA (BWA V2.0).

In an XGP system, a cell could cover up to 10km area in radium theoretically. This is considered sufficient single-cell coverage in rural area. Due to its scalable feature, the cell radium can be adjusted to fit the environment. For example, in urban area where there are more users, cell radium can be shrunk and more cells can be installed to guarantee the stable transmission at high speed when amount of users increase.

One of the most notable advantages of XGP is when a new cell station is to be added to a system in operation, no worry of interference is necessary. In systems such as WiMax and LTE, new cell establishment is so troublesome, considering that both systems identified themselves as macro cell systems on specification. To avoid interference, precise calculation and design must be done in prior to the new installation. If only the installation on a certain location or of a certain antenna failed to meet the calculation and design, no qualified service can be expected. In comparison, XGP is completely free of this worry. A new cell can be added to whichever available neighborhood buildings to cover the same area, as it is furbished with DCA function. In another word, base station is built to be an intelligent from the beginning and it chooses less interfered channel for communication automatically.

Backbone network of XGP is built on optical fiber, while the last mile service is cordless. We consider it the most suitable network for users, as both voice and data

service are based on local network by respective countries, and service can be provided at lowest possible cost. LTE is technically possible, although in execution, operators could suffer severe shrink in income once APRU deteriorates.

The major advantages of XGP are:

●XGP is the last debut and the improved BWA
●XGP is acknowledged and recommended by ITU-R and ARIB as an international standard
●XGP can provide over 80Mbps in communication speed (providing that both uplink and downlink using 20MHz bandwidth. The speed can be upgraded to over 300Mbps on adopting MIMO technology.)
●Cell size is scalable to correspond flexibly to both urban and rural condition.
●Cell planning is not demanded due to special ADCA function, therefore, cost is saved and installation process is simplified.
●Communication is possible under high-speed movement.
●Stable performance is guaranteed when users increase.
●It is most suitable to build optical fiber plus last-mile wireless solution in all IP network.
●Various potential functions can be developed with W-SIM concept.
●Adopting WiMax multipurpose hardware enables XGP network to be built at same cost with better function.
●Making use of location advantage of cell stations, ASP businesses such as camera monitoring system and weather forecasting system can be developed.
●Gradual network upgrading is possible with existing PHS network, which guarantees bandwidth with asset appreciation.

Meanwhile, XGP provides the following benefits for its operators:

1, Same cell cost and terminal cost with LTE and WiMax.
2, Much lower international roaming cost than other systems.
3, Much simpler technique in new cell establishment.
4, Service in high-speed movement, which is puzzling WiMax.

We believe that once XGP is spread worldwide, the existing business models of telecom

operators will subject to a thorough change, and the way to use computer and UMPC will change accordingly. Hence, it will definitely result in a major transformation of paradigm in several ten years.

September, 2008
Sean Sugiura
Secretary General
XGP Forum

1. What is XGP ?

XGP is one of the high-speed big-capacity wireless telecommunication systems standardized by PHS MoU Group in September 2007, categorized as one of the Broadband Wireless Access（BWA） technologies recommended in ITU-R Advice M. 1801.
XGP adopts OFDMA/TDMA/TDD as access method. XGP grants improved frequency efficiency per unit by adopting AAS, SDMA and MIMO technologies.

XGP has several predominant differences from other BWA systems as shown below:

1) Intelligent Cell Station System provides scalable cell size from Macro Cell for crowded urban area to Micro Cell to for rural area.

2) Intelligent Cell Station System provides Autonomous Distributed Control realized known for DCA (Dynamic Channel Allocation) As one area of XGP service is always covered with multiple cells, it assures you many coverage by various cells around the user Therefore, per user throughput doesn’t easily deteriorate even when the total amount of users increase in that area.

3) And this is so important to know for XGP operator that the precise cell design is no longer needed owning to Autonomous Distributed Control by DCA adjusting itself to provide maximized performance without the prior cell installation planning study.

Therefore, it becomes easy to build extra cells to the area where many subscribers are in use.

4) Thanks to Intelligent Cell Station System, the mobility of user terminal called Hand-Off has been increased to up to 300km/h.

2 Trend of Mobile BWA

2.1 Trend of Mobile BWA of ITU-R

In ITU-R, mobile BWA related business is covered by Working Party 8A(here in after as WP8A), which is in charge of Land Mobile Service Excluding IMT-2000 and Amateur and Amateur-satellite Service.WP8A compiled Recommendation ITU-R M.1801, known as Radio Interface Standards for Broadband Wireless Access Systems, Including Mobile and Nomadic Applications, in the Mobile Service Operating below 6 GHz, and recommended the use of several mobile BWA systems. The recommended systems can be categorized in 5 types, each of which is proposed and supported by other recommendations or organizations.

(1) Radio-LAN (Recommendation ITU R M.1450 : IEEE 802.11, ETSI BRAN HIPERLAN, ARIB HiSWANa)
(2) IMT-2000(Recommendation ITU R M.1457 : CDMA Direct Spread, CDMA Multi-Carrier, CDMA TDD, TDMA Single-Carrier, FDMA/TDMA)
(3) Harmonized IEEE and ETSI radio interface standards (IEEE 802.16, ETSI HiperMAN)
(4) ATIS WTSC radio interface standards (T1.723-2002, ATIS-0700001.2004, ATIS-0700004.2005, T1.716/7-2000(R2004))
(5) Next-generation PHS (A-GN4.00-01-TS)

The recommendation, which is the most important advising document of mobile BWA by now, is finally approved in March and promulgated in June 2007. Of the five types listed above, (1) and (2) have been published and are referred in ITU-R recommendations as the recommended Radio-LAN and IMT-2000 technologies. Those that are considered as principal mobile BWA technologies are the remaining (3), (4)and(5). “(5) Next-generation PHS” is regarded as XGP.
In addition, WP8A compiled mobile BWA relevant document Report ITU-R M.2116, known as Characteristics of Broadband Wireless Access Systems Operating in the Land Mobile Service for Use in Sharing Studies and promulgated it in September 2007. In this report, the features of the above mentioned systems are described to find common points among them.

2.2 XGP History

The movement concerning standardizing Next Generation PHS is stated in Figure 2.1-1. PHS MoU Group established NWG in March 2006 to carry out standardization

activities. The XGP Specification, Ver01 Rev 02[A-GN4.00-01-TS] was approved on its 22nd general meeting in September 2007.

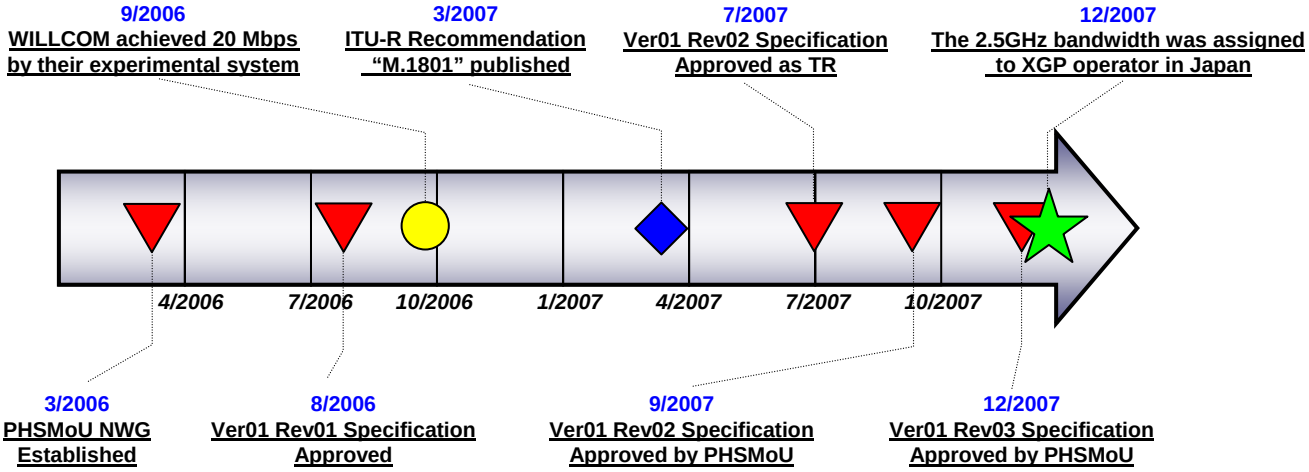


Figure 2.2-1 XGP History

Table2.2-1 Chronicle

March 2006	PHS MoU Group established NWG. The work to draft XGP Specification was formally started.
August 2006	XGP specification Ver01 Rev01 [A-GN4.00-01-TS] is approved as TS on 20th general meeting held in Hanoi, Vietnam.
September 2006	WILLCOM Inc. announced the realization of 20Mbps transmission speed in XGP field test.
March 2007	XGP is formally admitted as a BWA system in ITU-R Recommendation [M.1801].
July 2007	XGP specification Ver01 Rev02 was approved as TR on NWG meeting held in Suzhou, China.
September 2007	XGP specification Ver01 Rev02 [A-GN4.00-01-TS] was approved as TS on 22nd general meeting held in Chengdu, China. The standardizing process was completed.
December 2007	Ver01 Rev03 [A-GN4.00-01-TS] was approved at Hanamaki NWG meeting. The 2.5GHz bandwidth was assigned to XGP operator in Japan.

3 Features of XGP

3.1 OFDMA/TDMA/TDD

XGP adopts OFDMA/TDMA as multi dimension access method and TDD as duplex method. Besides FDMA/TDD method, SC-FDMA/TDD method can also be adopted for UL (uplink).

The co-existence of OFDMA/TDD and SC-FDMA/TDD method is possible during uplink. The structure of TDMA slot is symmetrical with 625 us x 4 slots for uplink and 625 us x 4 slots for downlink. This structure is the same with PHS system, which made its co-existence with XGP possible.

The symmetrical structure of TDMA slot guarantees its good affinity with AAS and SDMA. XGP adopted AAS and SDMA technology to improve the efficiency in using radio frequency resource.

The technical reference for XGP are displayed in the following charts: General parameter for XGP

Table 3.1-1 General parameter for XGP

Duplex method	TDD
Downlink access method	OFDMA/TDMA
Uplink access method	OFDMA, SC-FDMA/TDMA
TDMA slot period	625 us
TDMA frame period	5 ms
Number of slots in one frame	8 slots, 4 slots for transmission and 4 slots for reception symmetrically

Table3.1-2 Individual parameters for each system bandwidth

System bandwidth [MHz]	1.25	2.5	5	10		20		
Effective channel bandwidth [MHz]	0.9	1.8	3.6	8.1	9	16.2	17.1	18
Guard bandwidth [MHz]	0.35	0.7	1.4	1.9	1	3.8	2.9	2
Number of sub channels	1	2	4	9	10	18	19	20
Total number of PRU	4	8	16	36	40	72	76	80

The following chart displays TDMA/TDD method adopted in PHS and OFDMA/TDMA/TDD method adopted in XGP.

One communication channel is assigned to one timeslot in PHS. Taking advantage of

the OFDM feature of XGP, multiplexing plural units (PRU) in one timeslot is realized. The amount of multipliable PRUs can increase or decrease according to the system bandwidth.

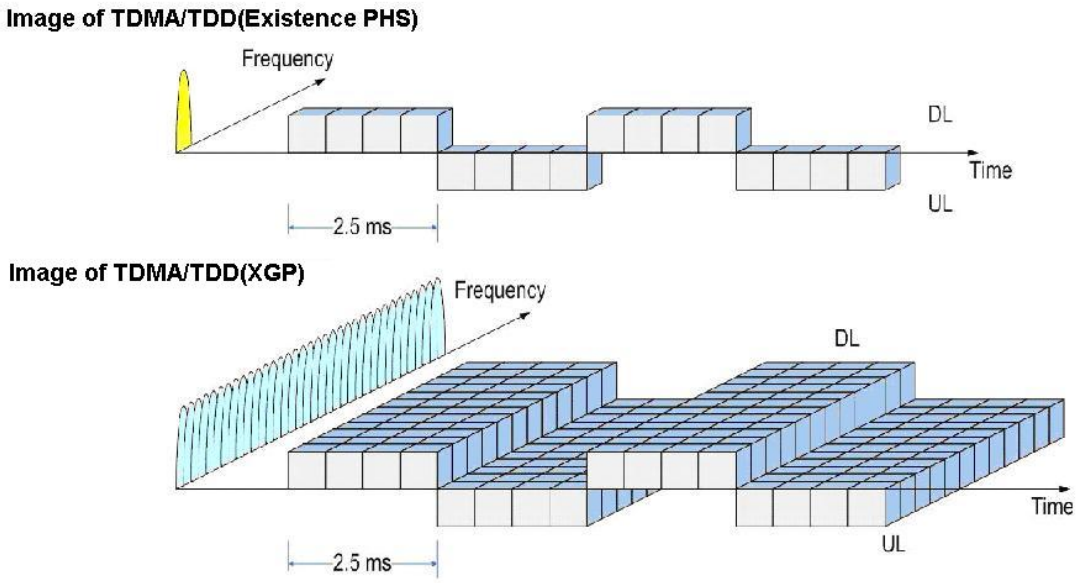


Figure3.1-1 OFDMA/TDMA/TDD

3.2 Terminal Variation and Development Cost

As long as a terminal keeps one PRU for transmitting and receiving data, it can be used for communication in XGP system.

That is, the system doesn't request all terminals to hold ability to transmitting and receiving data with full bandwidth.

One can choose OFDMA or SC-FDMA as UL access method according to the function of a terminal.

If SC-FDMA is chosen as the UL access method, the development of terminal can be easier as the disposal process can be better simplified than OFDMA.

For example, high-end terminal for high-speed communication uses OFDMA for both UL and DL communication and is equipped with wireless device that can transmit and receive data with full bandwidth.

Low-end terminal used basically for voice communication uses SC-FDMA for UL communication and is equipped with only one PRU to transmit and receive data, in order to reduce cost.

This feature allows development of terminals with different functions and usages by choosing access method for UL and bandwidth for data transmission.

That is, developing different types of terminals in correspondence with different users' needs becomes possible.

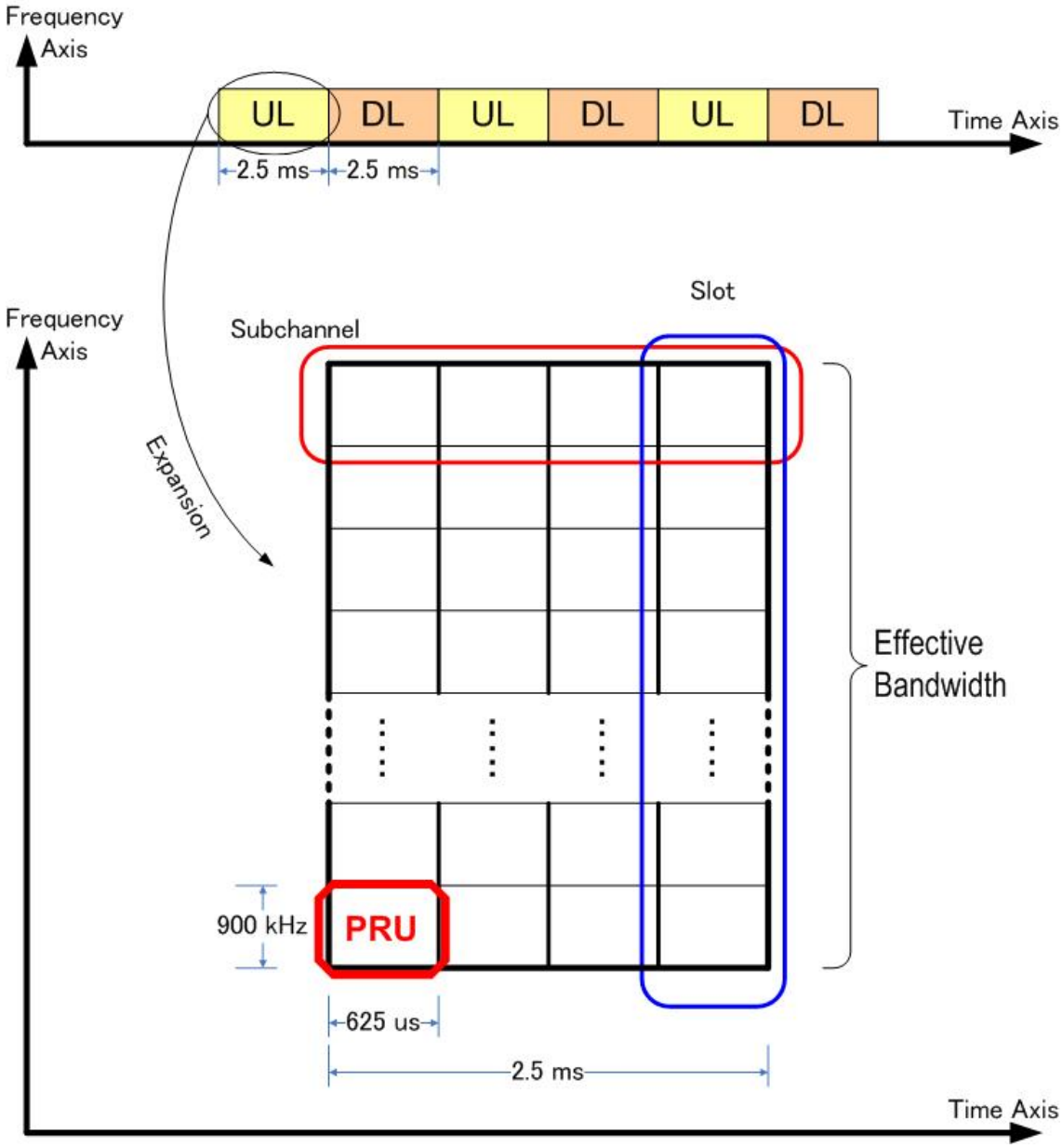


Figure3.2-1 PRU (Physical Resource Unit)

3.3 Dynamic Channel Assignment (DCA)

The PRU to be used in XGP adopts DCA method to execute "carrier sensing" function to detect if a source has already been used by other users, hence, to avoid interference with other users while assigning adaptive channel. That is, BS carries out carrier

sensing after receiving a wireless link establishment demand from BS. Unused resource of PRU is assigned to the demanding user according to the result of carrier sensing.
By adopting DCA method, the centralized control device in wireless base station is saved and Autonomous Distributed Control is realized.
As one base station can share PRU with its adjacent base stations, installation design on adding new base stations becomes unnecessary.

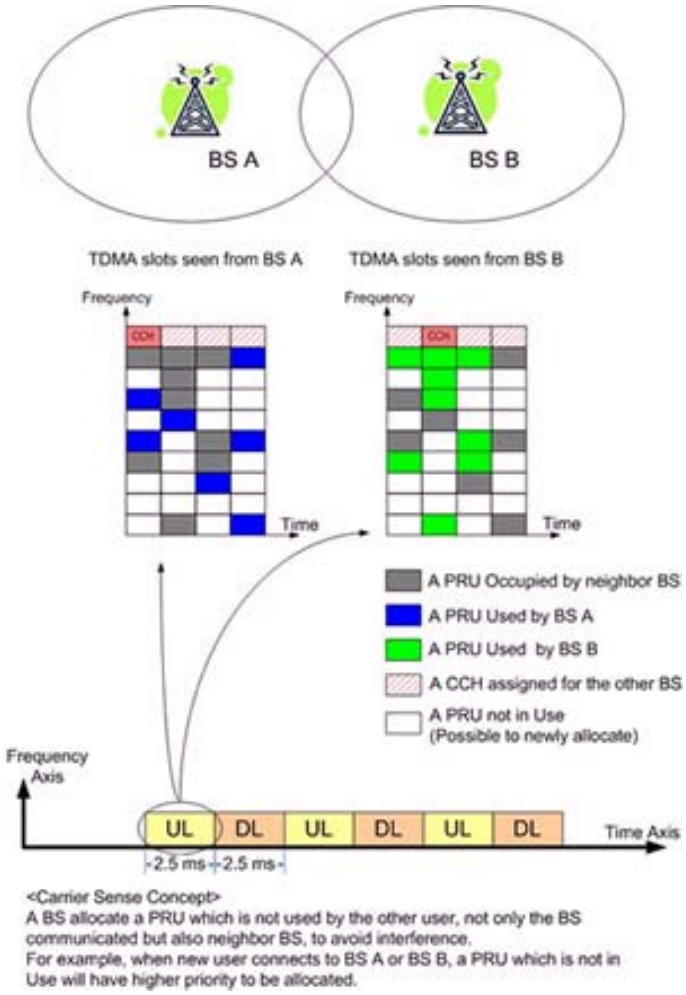


Figure3.3-1 DCA (Dynamic Channel Assignment)

3.4 Micro Cell

Mobile system such as GSM and W-CDMA adopts macro cells with each covering an area of several kilometers to several ten kilometers in radius.
On the other hand, XGP adopts micro cells with each covering an area of no more than several hundred meters in radius.
The reasons to choose micro cell system are stated below:

1. Per unit efficient on frequency usage improves and system capacity increases. This is how flat rate service becomes possible.
2. As service at reasonably affordable rate begins, more cell stations shall be installed to cover more areas and more users.
3. Autonomous Distributed Control function is activated in heavy traffic areas with plural cell stations. Hence, per user throughput is maximized.
4. Comparing the declining rate of throughput by number of increased users in certain area, micro cell system suffers a lower one than macro cell system, which covers the whole area with one cell.

Since reduction of electric output to the terminal is realized, size of the terminal can be minimized and battery becomes more durable.
Meanwhile, base station can be minimized for the same reason.

1. Hence, cell station can be installed in narrow and closed space like inner building or underground street.
2. Layout of cell stations can be carried out in accordance with traffic condition, such as increasing cell density in area with concentrated access.
3. Besides, when on cell station suffers unexpected breakdown, other cell stations around the area can take instant action as complement.
4. Therefore, we consider micro cell system a better communication system at time of disaster.

3.5 Overcoming the Weak Points of Micro Cell System

XGP takes into consideration of the adoption of macro cells as supplement to micro cells during system deployment.
By doing this, times for handover reduce as macro cells are adopted to cover area that correspond to connect requests during high speed movement. Therefore, communication quality is expected to improve during handover.
In addition, it is necessary to adopt plural base stations to cover a big area with wireless network that's constructed of micro cell only. Hence, it is most practical to expand service area by building micro cell system in areas with dense pollution and adopting macro cell system in areas with sparse population.

3.6 Two MAC Methods

The Mac methods adopted by PHS are QS-Mode and FM-Mode.

QS-Mode is a fixed assignment method that assigns PRUs as CSCH to all users. As wireless band is occupied by specified user during the assignment, the mode is adaptive to services such as voice communication with high demand of real time and high possibility to capture random data.

FM-Mode is a fixed assignment method that assigns one PRU as ANCH to all users. PRU for communication (EXCH) is dynamically assigned from each TDMA frame by MAP in the ANCH. That is, EXCH is shared by plural users instead of being monopolized by one user.

FM-Mode is adaptive to services such as high speed data communication as it can respond to the burst increase and decrease of data instantly.

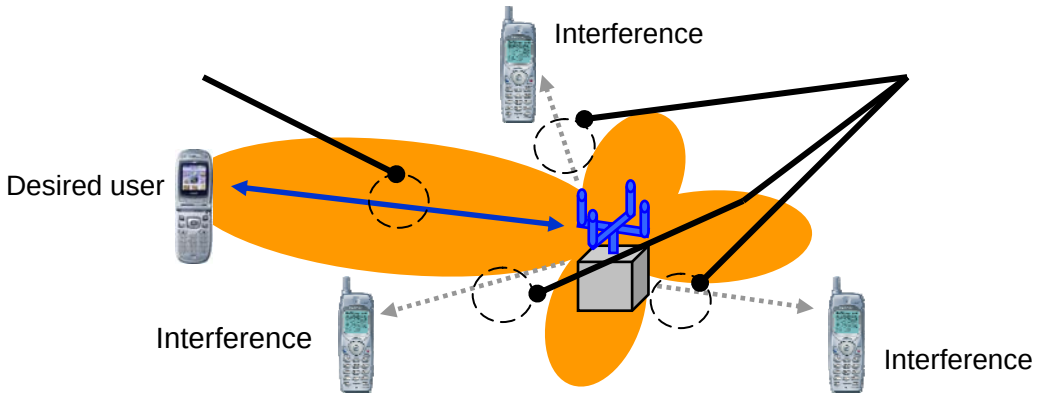
QS-Mode is always applied to control users who occupy the bandwidth in voice communication and FM-Mode is always applied to control users in data communication.

QS-Mode can also be used to control low-speed packet communication together with voice communication, in case when bandwidth for a system is narrow.

Besides, QCS-ID, which is adopted in XGP, can realize the function to assign multiple services to one user.

3.7 Adaptive Antenna System

Adaptive Antenna System, which is also called Smart Antenna, is the technology that uses multiple antennas and combines received signals of each antenna adaptively to orient radio waves to desired directions or control to avoid influence of unnecessary radio waves. With XGP that adopts the TDMA/TDD system, this technology can be effectively applied to both transmission and reception. It has the potential to increase XGP network capacity and also makes it possible to cover a wider area with less cost. Figure3.7-1 shows the image of coverage area by Adaptive Antenna System.



3.8 MIMO

Figure 3.7-1 Adaptive Antenna System

MIMO (Multiple Input and Multiple Output) is the system using several radio connections, such as multiple antennas to convey the data in parallel to make the data speed faster while avoid interference efficiently. This technique helps realize a faster data speed and more effective usage of frequency. According to the number of antenna, 2 by 2 MIMO and 4 by 4 MIMO technique is under development.

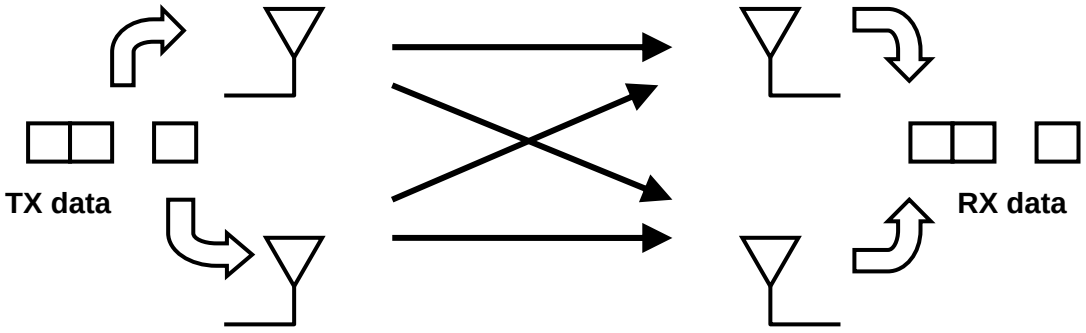


Figure 3.8-1 MIMO Control

3.9 Co-existence with PHS

XGP system adopts symmetrical construction with each TDMA slot of 2.5ms for UL and DL respectively (5ms jointly). This is the same construction with PHS. The following two methods are considered to coexist XGP with PHS in the same bandwidth.

1) Establish a guard band in between PHS and XGP to enable the simultaneous operation of the two systems.
2) Isolate PHS with XGP on TDMA slot base. For example, assign TS (Time Slot) 1 and TS 2 for PHS and assign TS 3 and TS 4 slots to XGP only.

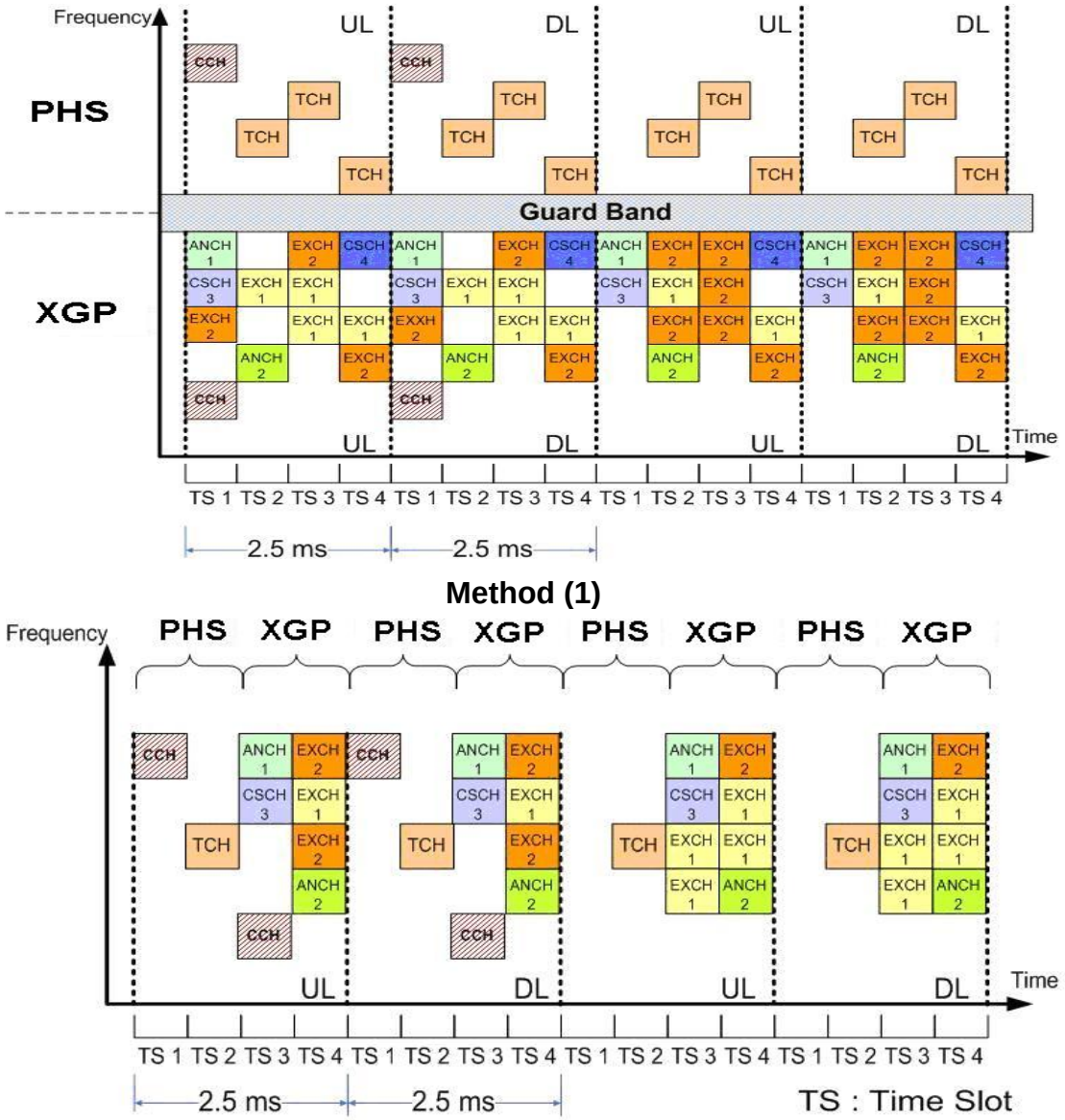


Figure3.7-1 Co-existence of PHS and XGP

3.10 Comparison with Other BWA Systems

The major technical References of XGP (Comparison with Competing Technology) in Table 3.10-1.

Table 3.10-1 General Comparison of XGP and, other systems

System / Items	XGP	Other BWA System	Mobile System
Cell Structure	-Micro Cell + Macro Cell -Mainly adopting micro cells in places with heavy traffic -Overlapped coverage of multiple cells is allowed	-Restricted to Macro Cell -One base station covers comparatively broad area -To avoid interference between each other, overlapped coverage of multiple cells is not allowed	-Restricted to Macro Cell -One base station covers comparatively broad area -To avoid interference between each other, overlapped coverage of multiple cells is not allowed
Data Communication Speed	-Per user data speed can be maintained high in high traffic due to the multiple choices of base station that can diversify the traffic	-Per user data speed tends to fall when traffic is busy, as multiple users are concentrated on one base station	-Per user data speed tends to fall when traffic is busy, as multiple users are concentrated on one base station
Network Structure	-Investment on network facility can be kept low by making use of the existing IP network	-Investment on network facility can be kept low by making use of existing IP network	-Investment cost on network is enormous as network structure being independent
Utilizing Form	-Terminal to base station indoor or outdoor (Public Mode) -Terminal to base station indoor or outdoor (Private Mode)*1	-Terminal to base station outdoor	-Terminal to base station outdoor
Channel Allotment Method	-No restriction on location of base station due to dynamic channel allotment, which makes amplification of base stations easy	-Delicate design is needed to install a base station due to fixed channel allotment -Amplification is difficult because adjustment with the existing base stations is needed on adding a new base station	-Delicate design is needed to install a base station due to fixed channel allotment -Amplification is difficult because adjustment with the existing base stations is needed on adding a new base station
Trend (Nov. 2007)	-Standardization process completed in September 2007 -WILLCOM Inc. has started studies jointly with AWC in Thailand to apply XGP system	-WiMAX is adopted in ITU Recommendation as one of the IMT-2000 methods -Standardization of UMB is not completed	-Research and development concerning Super 3G、4G is undergoing, although the main stream is GSM of the 2nd generation

Item with *1 means standardization unexecuted.

Micro cell method uses multiple base stations to cover one area. As a result, users are dispersed on different base stations and data communication speed per user is maximized.

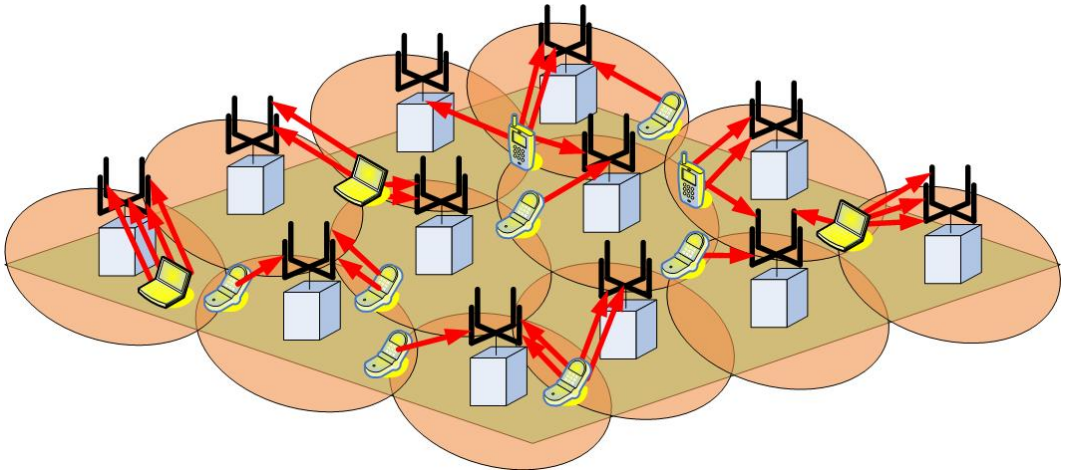


Figure 3.10-1 Micro cell method

A big amount of users are concentrated on one base station, as one base station covers a wide range of area in macro cell method. As a result, data-transfer velocity per one user tends to fall.

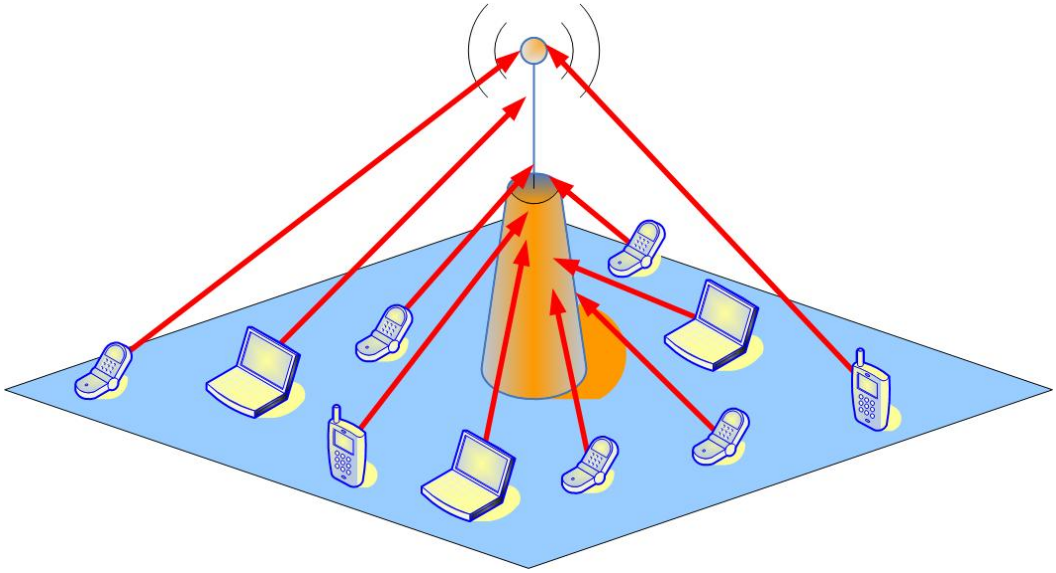


Figure3.10-2 Macro cell method

3.11 Characteristics of XGP

Table 3.11-1 Characteristics of XGP

	BS	MS
Typical BER or FER	-	-
Transmitter Radiation pattern	omni-directional etc	omni-directional etc
Transmitter Antenna polarization	Vertical etc	Vertical etc
IF Filter Bandwidth (kHz)	9600	9600
Sensitivity (dBm)	BER = 1.0 * 10^{-5} FEC adopted BPSK : -90 dBm QPSK : -87 dBm 16QAM : -78 dBm 32QAM : -75 dBm 64QAM : -71 dBm 256QAM : -64 dBm	BER = 1.0 * 10^{-5} FEC adopted BPSK : -88 dBm QPSK : -85 dBm 16QAM : -76 dBm 32QAM : -73 dBm 64QAM : -69 dBm 256QAM : -62 dBm
Blocking characteristics	-45 dBm 10 MHz away from center	-55 dBm 10 MHz away from center
Intermodulation spurious response attenuation (dB)	42	30
Receiver Radiation pattern	omni-directional etc	omni-directional etc
Receiver Antenna polarization	Vertical etc	Vertical etc

Parameter	XGP	
	BS	MS
System-wide		
Nominal channel BW (MHz)	10 {1c}	
Carrier frequency	< 6 GHz	
Emission type	Digital	
Deployment type	Cellular	
Modulation type	BPSK, QPSK, 16-QAM, 32-QAM, 64-QAM, 256-QAM	BPSK, QPSK, 16-QAM, 32-QAM, 64-QAM, 256-QAM
Duplex method	TDD	
Access technique	TDMA/OFDMA	
No. of sectors	1or more	n/a
Reuse factor	1:1	
Antennas per sector	4 or more	1 or more
Co-located antenna minimum coupling loss (dB) {3}	30	n/a
TX		
Average power (dBm)	40 {4a}	23{4a}
TDD activity factor (dB) {5}	3	
Antenna gain (dBi)	12 or more	0 to 4
Antenna height AGL (m)	15 to 45	1.5
Loss of gain due to down tilt (dB)	0	n/a
Misc. losses (dB)	2 {8b}	0
Adjacent channel leakage ratio, ACLR (dB)	{9d}	
ACLR_1 (dB)	40	23
ACLR_2 (dB)	60	33
RX		
Antenna gain (dBi)	12 or more	0 to 4
Antenna height AGL (m)	15 to 45	1.5

Parameter	XGP	
	BS	MS
Misc. losses (dB)	2 {8b}	0
Loss of gain due to down tilt (dB)	0	n/a
Noise figure (dB)	5	7
Thermal noise density (dBm/Hz)	–174	
Adjacent channel selectivity, ACS (dB)	{11b}	
ACS_1 (dB)	42	30
ACS_2 (dB)	42	30
Interference criterion, *I/N* (dB) {12a}	–6 or –10	–6 or –10
Required SINR (dB) {12b}		
Max. tolerable interference power (dBm){13}	–105 or –109	–103 or –107
Active interference selectivity (dB)	Not specified	n/a

4. Applications of XGP

XGP provides brand new life style for everyone.

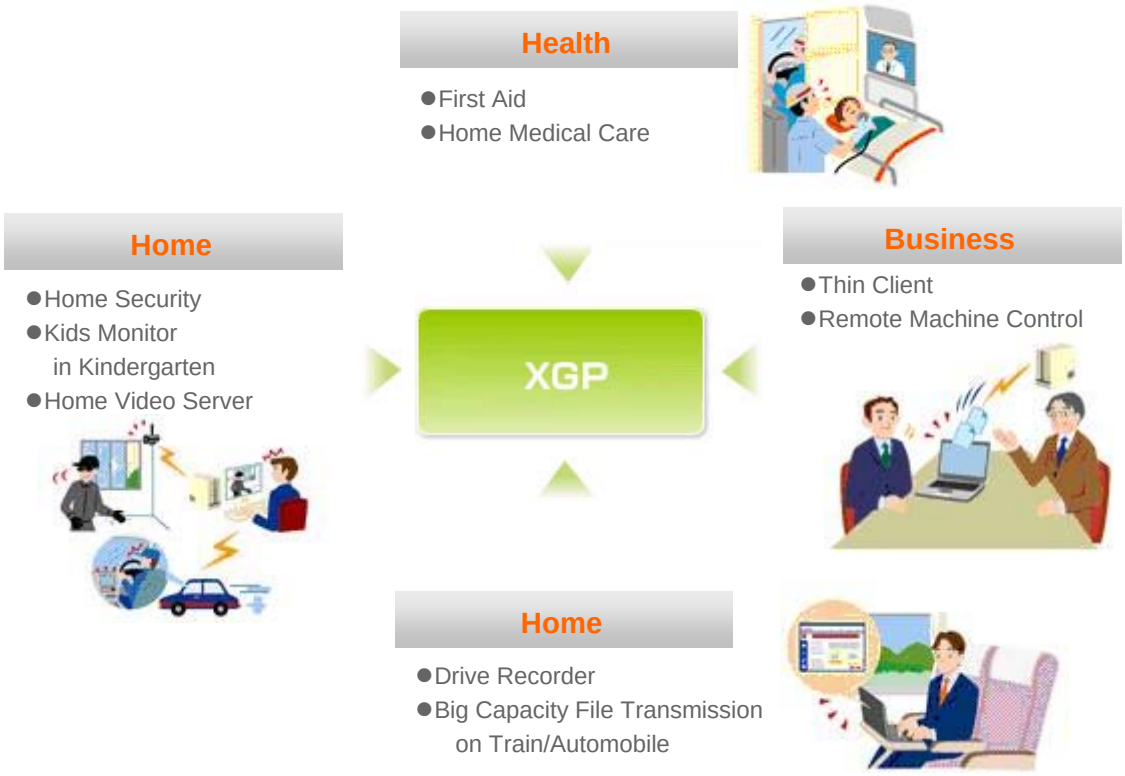


Figure4-1 Example of XGP's Applications

4.1 Applications in Health

♦ **First Aid**

XGP grants stable telecom environment in a moving automobile.

Contact hospital for acceptance preparation in possible while a handset data base is looking for the most suitable medical institutions and available doctor resources according to a patient's situation. Besides, when there is need for first-aid treatment on ambulance, professional doctors in hospital can always give guide by watching video taken on spot and sent via TV phone, and by receiving

Figure4.1-1 First Aid

simultaneously of the patient' data measured on spot.

The good performance of XGP on velocity, capacity and mobility enables simultaneous access of voice communication, data communication and animation transmission in movement.

- **Home Medical Care**

XGP can be connected with medical device at home as a meter reader, and a doctor in hospital can give diagnosis and treatment by reading a data such as blood pressure in distance and talking over TV phone with a patient. In addition, it is possible for hospital to supervise patients and collect necessary information for medical treatment during his/her sleep. When abnormal situation is observed, image or animated guide can be transmitted to help with home treatment.

Figure4.1-2 Home Medical Care

4.2 Applications at Home

- **Home Security**

When a security sensor installed in a home reacts, alarm on the XGP terminal of the nearest security guard as well as that of the officer-in-charge at security center will buzz, and the security camera will show the situation immediately. Security staff can make quick and correct response or to call police car on seeing the image information.

Figure4.2-1 Home Security

- **Kids Monitor in Kindergarten**

Parents can see their kids at kindergarten via images or animations sent to their XGP terminals. Drivers of school bus can tell from car navigator if an XGP terminal holding kid is absent from the waiting point before he/she arrives at next stop.

Figure4.2-2 Kids Monitor

♦ **Home Video Server**

XGP terminal can be connected to video camera for home use. By taking advantage of the high-speed big-capacity telecommunication tool, the need to write information down to a media such as HDD or DVD before play it on home server is gone.

Of course, a video camera without a recording media would become smaller in size and lighter by weight.

Figure4.2-3 Home Video Server

4.3 Applications as Mobile

♦ **Drive Recorder**

When a drive recorder is attached to XGP terminal, the images of the car in movement can be detected and supervised in distance.

When a police car is chasing a criminal suspect, images can be transmitted to monitor center and instructions can be given remotely.

♦ **Big Capacity File Transmission on Train/Automobile**

Even in high-speed movement, big-size file can be easily transmitted.

Figure4.3-1 Drive Recorder

Figure4.3-2 File Transmission on Train/Automobile

4.4 Applications in Business

♦ **Thin Client**

Today when business information and security are carefully treated, the trend of using

mobile PC without hard disk is also expanding. Sending and receiving big-capacity file via XGP can be a good choice in this case. One can easily access his/her own company's data base during business negotiation, getting product speculations or product images, requesting data for presentation, or checking available stock to ask for or to take an order.

Figure4.4-1 Thin Client

- **Remote Machine Control**

XGP can even be used to monitor water level of a river.

Data reflected on measuring instrument is collected by XGP device and sent back to monitoring center as images. By doing this, supervision of warning water level in distance is enabling.

Figure4.4-2 Remote Control

4.5 Other Applications

- **Campus Network**

XGP can provide seamless commutation environment without swap of communication device and communication method on campus.

For mobile computing users in a campus network, wireless LAN is at most a support within restricted areas such as classrooms. Data communication card will be needed once PC is taken outdoor. XGP doesn't reply on local Wireless LAN and it holds big enough capacity to support constant access without need for swap. Finally, XGP is the one that is able to provide mobile centrex environment for campus network.

Appendix: Glossary

AAS	Adaptive Array system
ANCH	Anchor Channel
ARIB	Association of Radio Industries and Businesses
ARIB STD-T95	ARIB STandarD-T95 (OFDMA/TDMA TDD Broadband Wireless Access System (Next Generation PHS）ARIB STANDARD)
ATIS	Alliance for Telecommunications Industry Solutions
BRAN	Broadband Radio Access Network
BS	Billing System / Base Station
BWA	Broadband Wireless Access
CDMA	Code Division Multiple Access
CSCH	Circuit Switching Channel
DCA	Dynamic Channel Allocation/Dynamic Channel Assignment
DVD	Digital Versatile Disk
ETSI	European Telecommunications Standards Institute
EXCH	Extra Channel
FDD	Frequency Division Duplex
FDMA	Frequency Division Multiple Access
FM-Mode	Fast access channel based on MAP –Mode
GSM	Global System for Mobile communications
HC-SDMA	High Capacity-Spatial Division Multiple Access
HDD	Hard Disk Drive
HiSWANa	High Speed Wireless Access Network type a
IEEE	Institute of Electrical and Electronic Engineers
IMT-2000	International Mobile Telecommunication-2000
IP	Internet Protocol
ITU	International Telecommunication Union
ITU-R	ITU-Radio communication sector
ITU-T	ITU-Telecommunication standardization sector
LAN	Local Area Network
MAN	Metropolitan Area Network
MIMO	Multiple Input Multiple Output
MoU	Memorandum of Understanding
MPHPT	Ministry of Public Management, Home Affairs, Posts and Telecommunications, Japan

MS	Mobile Station
OFDMA	Orthogonal Frequency-Division Multiple Access
PC	Personal Computer
PHS	Personal Handy Phone System
PRU	Physical Resource Unit
PSK	Phase Shift Keying
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
QS-Mode	high Quality channel based on carrier-Sensing –Mode
RCR	Research & development Center for Radio system
RF	Radio Frequency
SC-FDMA	Single Carrier - Frequency Division Multiple Access
SDMA	Space Division Multiple Access
TCH	Traffic Channel
TDD	Time Division Duplex
TDMA	Time Division Multiple Access
TELEC	TELECOM ENGINEERING CENTER
TS	Technical Specification
TTC	Telecommunication Technology Committee
WiMAX	Worldwide Interoperability for Microwave Access
WTSC	Wireless Technology and Systems Committee’s
XGP	eXtended Global Platform
8PSK	8 Phase Shift Keying

Editor's Note

XGP is one of the promising BWA.
This handbook is guide to XGP, which is expected to launch in the coming days, and has been edited in order to deliver the basic technology and application regarding XGP.
XGP website will be updated continuously, and URL is as follows
"**http://www.xgpforum.com/**".

We look forward to your visit.

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