

Development of MIMO-MESH Point

<Program for Fostering Regional Innovation (Global Type) >

Project Team

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Enterprises : Several Companies

Purpose of the Research

After 30 years since their birth, both the Internet and cellular phone (mobile network) now became the symbols of the ICT society. The former provides various epoch-making services in every fields of industry and has brought about a revolution which changed people's social activity entirely. And the latter realized a society in which people can communicate freely with anyone at anytime and from anywhere in the world. The mobile network, which is placed under the physical restriction of narrow band, is far behind of the Internet in respects of the quality and quantity of the contents and services

it can provide.

What is required from the post-ICT society is to make the vast amount of knowledge and services contained in the Internet omnipresent (ubiquitous) by using the mobile network. To that end, freeing the mobile network from the restrictions of narrow band or broadbandization of it is absolutely necessary. The objective of this research is to develop the key infrastructure for realizing the ubiquitous broadband mobile communication which is required in the post-ICT society for the next 20 years to come.

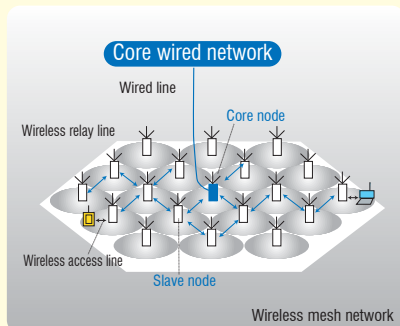
Summary of the Research

Essentially, the only technology which is able to reduce the amount of wire backhaul line to be laid down is the MESH network. The MESH network refers to a network created by connecting each base station wirelessly. In this network, one unit is designated as a core base station, which is connected to the wired circuit, in a group of

several or over ten stations, and this station is used as the starting point in installing multiple relaying base stations connected wirelessly. In this way, the cost for laying down wired circuit can be reduced, while maintaining the size of the area.

To reduce the cost, it is desirable to have as many relaying base stations connected to the core base station wirelessly as possible, and in order to realize this, the MESH network system with a high circuit capacity in relaying is necessary.

The objective of this research is to study and develop a wireless MESH network system with a high circuit capacity in relaying which is small enough to fit in the palm of a hand but able to create an broadband communication area instantly by just installing it.



●The 3 core technologies supporting this project

IPT method (Intermittent Periodic Transmit)

This is an original packet transmission protocol which is able to accomplish a high relaying transmission efficiency by managing the radio interference well. It has accomplished a throughput of twice as fast as the conventional relaying transmission method in a 10-step hop.

Application of MIMO

By applying MIMO, it will be possible to improve the transmission speed even in a limited frequency bandwidth by increasing the number of antennas. In other words, the bandwidth required to realize a large-capacity relaying can be replaced with a large number of antennas by utilizing MIMO.



Downsizing the antenna

To extend the distance for transmission between the MESH base stations, antennas with a high gain in the main axis are required, but the higher the gain is, the larger the antenna size becomes. Therefore, we are going to apply the small antenna technology owned by this study group to realize the downsizing of the antenna.



Results of the Research



Battery drive



Over 10hops multihop

900g
Light weight

IPT
Original frame forwarding protocol



WiFi access

Spillover Effects of the Results of the Research

Society

If a PC has a wireless broadband communication capability, there is no need to have a mass storage, high-speed CPU, nor memory with a large capacity. All kinds of software including e-mail, word processor, and spreadsheet can be provided on the Web as a broadband application. As a result, it is no longer a dream to see the emergence of a PC with a long battery duration which is comparable to the present cellular phone.

Industrial community

When the environment in which it is possible to perform broadband communication at anywhere is ready, the cost for voice calls will be reduced dramatically since the voice traffic requires only a small bandwidth.

If it becomes well-known that the environment in which wireless broadband can be used freely at low cost is realizable by adopting MESH, it would have an influence on the power balance between the operator and the phone manufacturer, and it may be an opportunity for the latter to start improving its worldwide competitiveness.



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