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<div align="center">論 文 内 容 要 旨</div>

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学位論文題目	Self-Reconstruction of Wireless Mesh Networks in Disaster Situation (災害時における無線メッシュネットワークの自己再構成)

内容要旨

In recent years, the world endured natural disasters in common, taking out hundreds of physical network devices, disconnected numerous vital communication and electricity cables.

In order to cope effectively with post-disaster emergency situations, verify the safety of people, facilitate information sharing in the vicinity, and provide communication services, network recovery mechanisms must be improved. As a basis of such a system, wireless mesh networks (WMNs), which aim at becoming a key practical communication solution to provide higher reliable network infrastructure for numerous emergent applications, have attracted much attention.

However, most of the existing work are based on IEEE 802.11 ad-hoc mode and considered as unpractical so that developers give much attention to the widely-used 802.11 infrastructure mode because of easy practical usage and cost reduction.

In this thesis, we propose a method to reconstruct a WMN based on the IEEE 802.11 infrastructure mode in disaster situation, comprising of one or more gateway (GW) routers and mesh routers.

The proposed method makes an association the isolated routers with the wired network using spare access points (APs) and all mesh routers including spare AP must be converged in the standard IEEE 802.11 infrastructure mode.

To achieve our goal, we first develop a spare AP placement method that mainly focuses on discovering an adequate location for a spare AP and making all the isolated routers reachable to the wired network. It has the following two phases; connectivity restoration phase and rerouting phase. In the connectivity restoration phase, we formulate received signal strength indication (RSSI) based localization algorithm to find the optimal point for placing the spare AP.

In the rerouting phase, each isolated router can assign an appropriate infrastructure mode such as AP and station (STA) to its interfaces in order to establish neighbor association so that it can be converged as having a best route to the wired network.

Furthermore, we consider that only public workers without any experience with wireless communication technologies must decide upon the adequate locations for spare APs and install them.

Next, we present an interface mode assignment method that decides which mode is suitable for an interface of an isolated router to establish an association with its neighbor router in order to enable all the isolated routers reachable to the wired network via a GW router.
This method is invoked after a spare AP has been installed.
It consists two phases including tentative routing and interface mode selection.

In the tentative routing phase, each isolated router can discover a route to a GW in a distributed manner.
In the interface mode selection phase, each isolated router can automatically form its neighbor connection in an infrastructure mode along its route to the GW.
Consequently, all the isolated router should be reachable to the wired network working in the infrastructure mode.

We show the results of performance evaluations to prove the effectiveness of both methods.
In addition, the results of field trials express the feasibility of the spare AP placement method.