504112505 G. Selda UYANIK
March 5, 2012

BLG609E - Special Topics: 4G Wideband Wireless Network Architectures
(Spring 2012)

Homework-3: Network Selection

Assigned patent: Methods and apparatus for selecting a communication network,
http://www.freepatentsonline.com/7389109.html
Filing date 03/30/2006.

1. Questions about patent (10 POINTS):

I. What in your own words is the main idea of the patent disclosure? Highlight the key new ideas being proposed. (At least 300 words. Please use your own language and do not just copy/paste from the patent).

Main idea of the patent is basically disclosing a method for choosing a communication network for a mobile device to operate on with paying attention to the communication services that the network provides. GSM standards actually cover network selection procedures: basically, the mobile device scans for available base stations and tries to connect to the strongest signal received one considering its preferences list that is hardcoded in SIM card (automatic selection mode). Manual selection mode can also be used for this kind of selection when available networks are visible on the device. However, the network selection process described in those GSM standards does not consider whether a network supports any data communication services or supports just voice communication. For this reason mobile device can then select a network with acceptable voice transmission capabilities but offering no data communication. Main idea of this patent is to overcome this problem by taking into account other services' availabilities on network selection process. Scanning process, as the authors named after, enables a mobile device to scan for available cellular networks for voice data and then discovers which networks support data communication (like e mail, internet access, a private intranet access, WAP service, application specific data services even like weather forecast etc.). Then priorities these networks and performs network selection accordingly.

The abstract, the background section and the section that includes claims are read carefully. There are 38 claims written but the independent claims are thought to be as follows:

Machine claim in this patent : Method proposed covers the selection of communication network both supporting circuit switched voice communication and packet switched data communication. Including *identifying* (performed by mobile device in order to search for networks supporting data comm.), *assigning priority* (to networks w.r.t. its data communication support), scanning and registering processes.

Independent machine claims in this patent : extends the first claim by specifying supports for e mail access, communication network identifying process, GPRS access (claims 2 to 7). Hardware specifications for working with both circuit and packet switched networks (8) and dependent claims for claim 8 including e mail access, GPRS etc. (9 to 12), using prioritized list for network selection (13, related ones are going forward to claim 20). This kind of detailed claims follow after about network selection procedures.

An independent method claim : is the claim 38 in which authors disclose choosing a communication network with taking account data communication services' availability.

II. Do you think that the patent can be deployed in the market and why?

I think this patent can be deployed in the market because there is a highly increasing need for data communications for mobile devices especially with the spreading of the smart electronic devices

(PDAs, smart phones including SIM cards and used for both voice and data com.) supporting many functionalities related to data communications. People are getting more familiar with such devices and these devices are being designed taking into account of the ease of use (like Apple iPad). Therefore, society will and actually is using many of such devices and produce a high demand on data communicaitons.

2. There are new attempts to make connecting to Wifi networks as easy as connecting to cellular network. This is made possible by a set of standards called. Try to find out more about HotSpot 2.0 from the web and explain in high level, (i) how network discovery and selection is expected to occur, (ii) authentication methods supported and (iii) what is Service Discovery and what how can this be used. (5 POINTS)

Note: Answers are written with reference to Cisco's vision for the next-generation hotspot which is given with the whitepaper: [1]. (Actualy, they are describing The Cisco Next-Generation Hotspot that builds on Hotspot 2, however many references were pointing forward this white paper for understanding HotSpot 2.0)

i. How network discovery and selection is expected to occur in HotSpot 2.0:

IEEE 802.11u (standard that describes "Interworking with External Networks" to provide an effective interface between an IEEE 802.11 access network and carrier networks,") has "Network discovery and selection" that is one of the additional features it adds to IEEE 802.11.

Network selection by a mobile device is expected to be autonomously performed by the device without user interaction. For achieving this purpose, it has methods like the discovery of suitable networks, Generic Advertisement Service (GAS) and Access Network Query Protocol (ANQP) [1].

ii. Authentication methods supported in HotSpot 2.0:

The authentication methods (Extensible Authentication Protocol versions) supported in HotSpot 2.0 are: EAP-SIM (RFC-4186, credential type: SIM), EAP-AKA (RFC-4187, credential type: USIM), EAP-TLS (RFC-5216, credential type: X.509 certificate) and EAP-FAST (RFC-4851, credential type: username/password). [1]

iii. Definition of Service Discovery and its use:

Mobility Services Advertisement Protocol (MSAP) is a protocol for service discovery, enabling the connection of users to the venue services. Venue services are the local services provided by some firms/owners etc. specially available for the specific hotspot users -for example customers within a shopping center-, and usually these services are not wanted to be accessible through the public Internet. Mobile devices can perform an MSAP query and securely retrieve these services and retrieve region specific (their connection range, -can retrieve such info only from a connectable WiFi AP-) information/applications etc. Sample usage can be a map display for visitors in a stadium [1].

- REFERENCES:

[1] Cisco. (2012, March). The Future of Hotspots: Making Wi-Fi as Secure and Easy to Use as Cellular (White Paper). [Online]. Available: http://www.cisco.com/en/US/solutions/collateral/ns341/ns524/ns673/white_paper_c11-649337.pdf

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- agree, but since most networks provide data service applicability of this seems to be limited!

HotSpot 2.0 ⇒ enable 3G devices to connect to WiFi networks.

WFA is specifying 802.11u.