

Saving Power for Mobile Phones via Partial Wi-Fi Scanning

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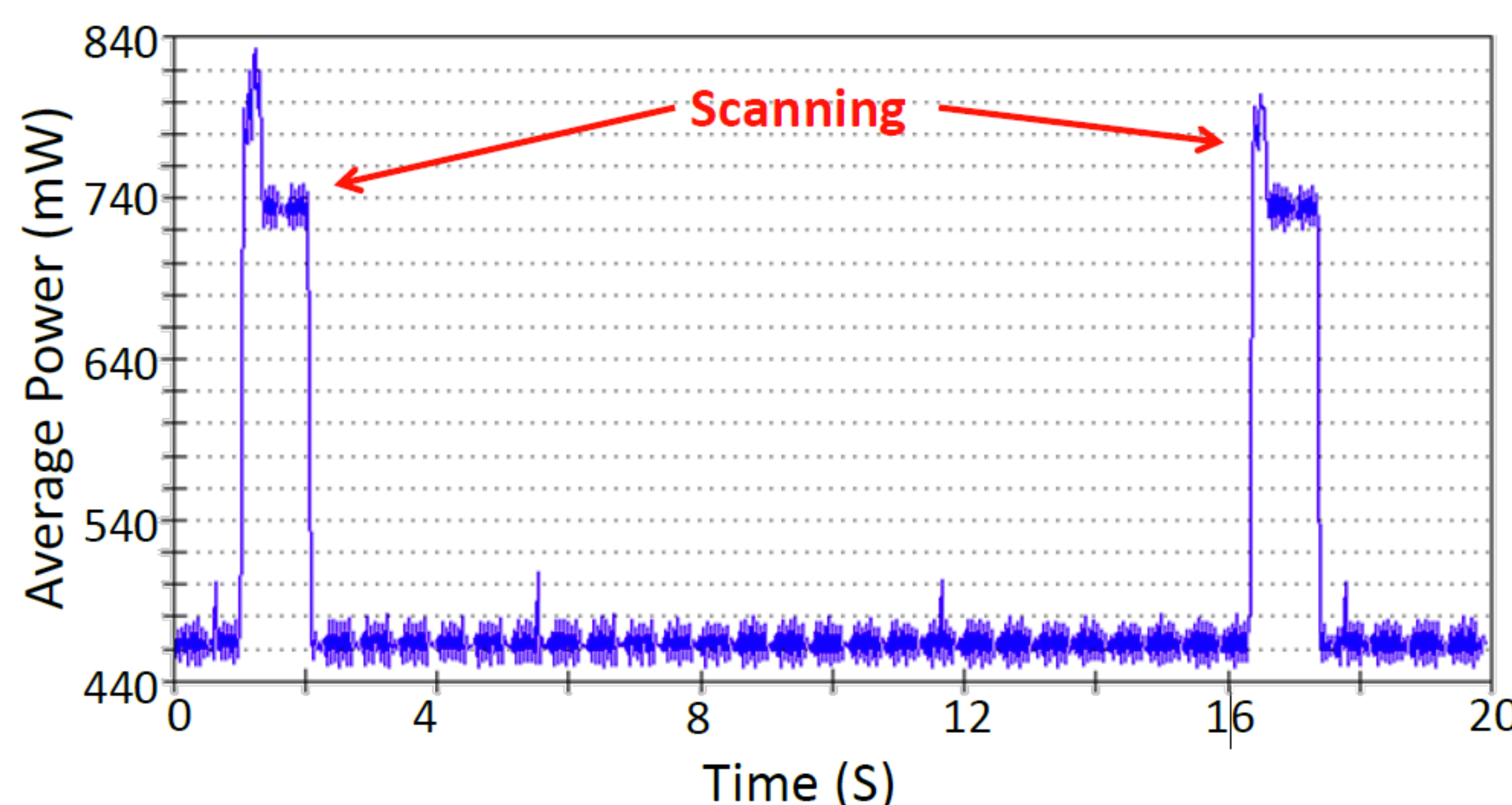


Motivation



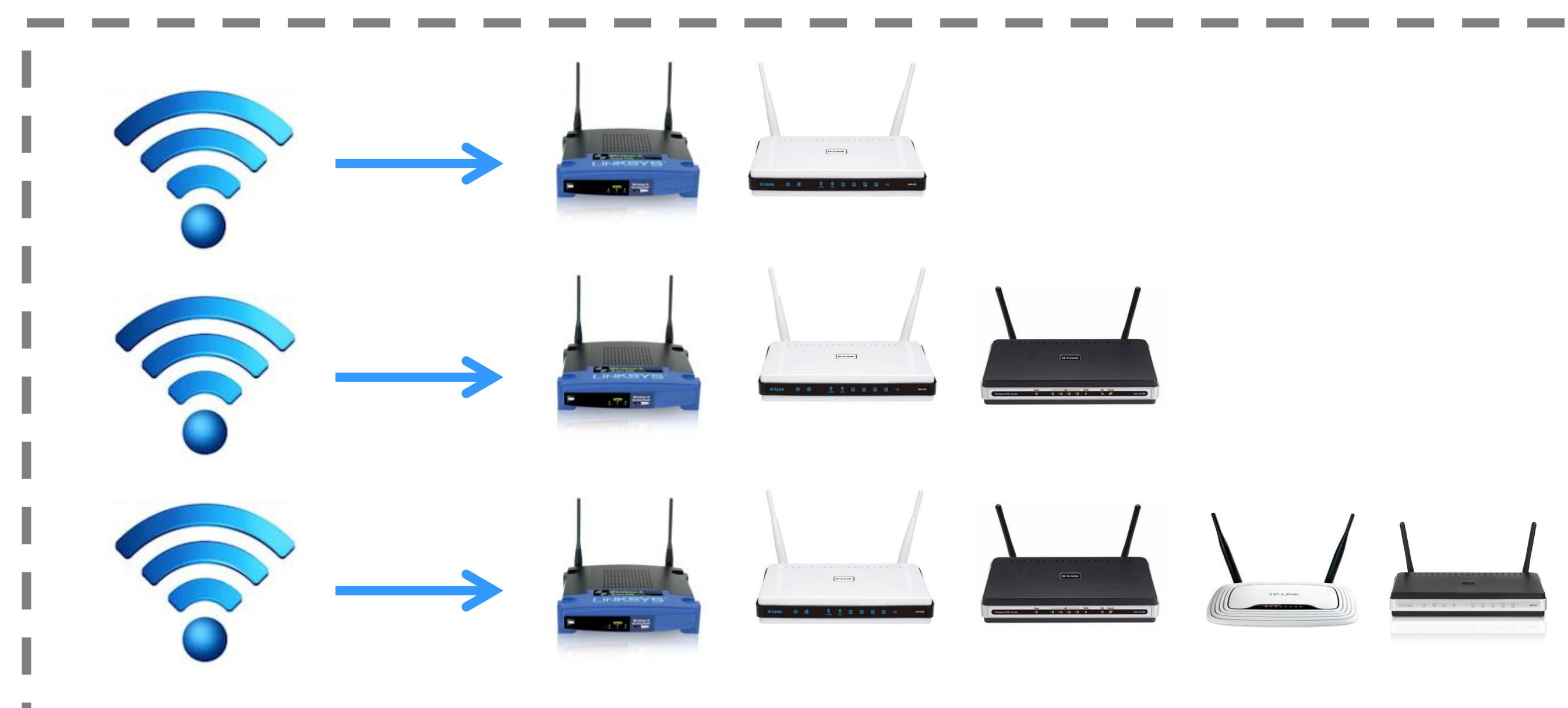
Smart phones scans for Wi-Fi networks all the time, until the phone is able to connect to one of them.

A scanning happens every 15 seconds, and each time it consumes 20uAh energy, with an average power 57% more than the non-scan state.

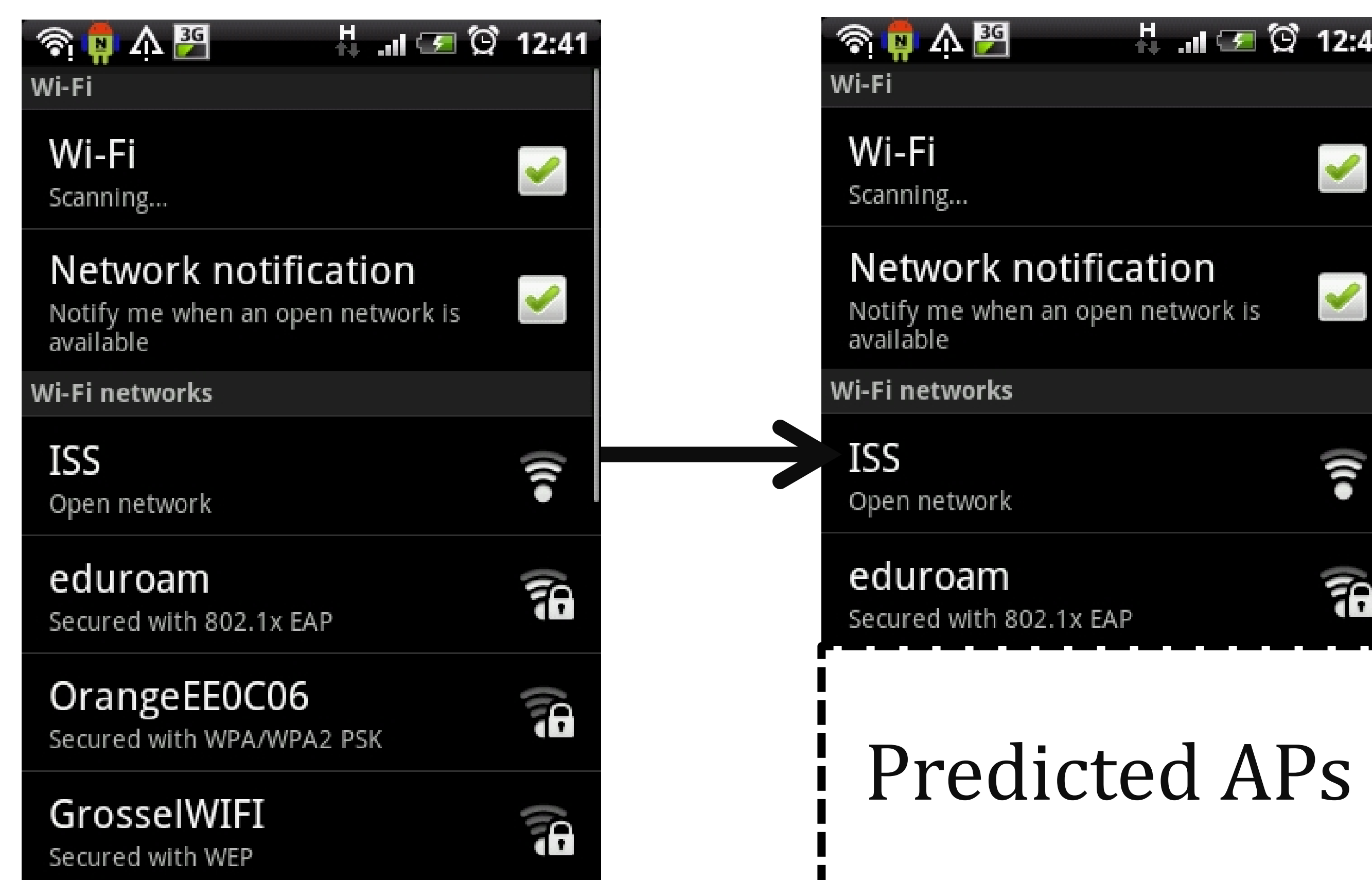


Intuition

During each scanning, results are not returned at once, but through several rounds. Every round some new discovered access points (APs) are added into the results list.

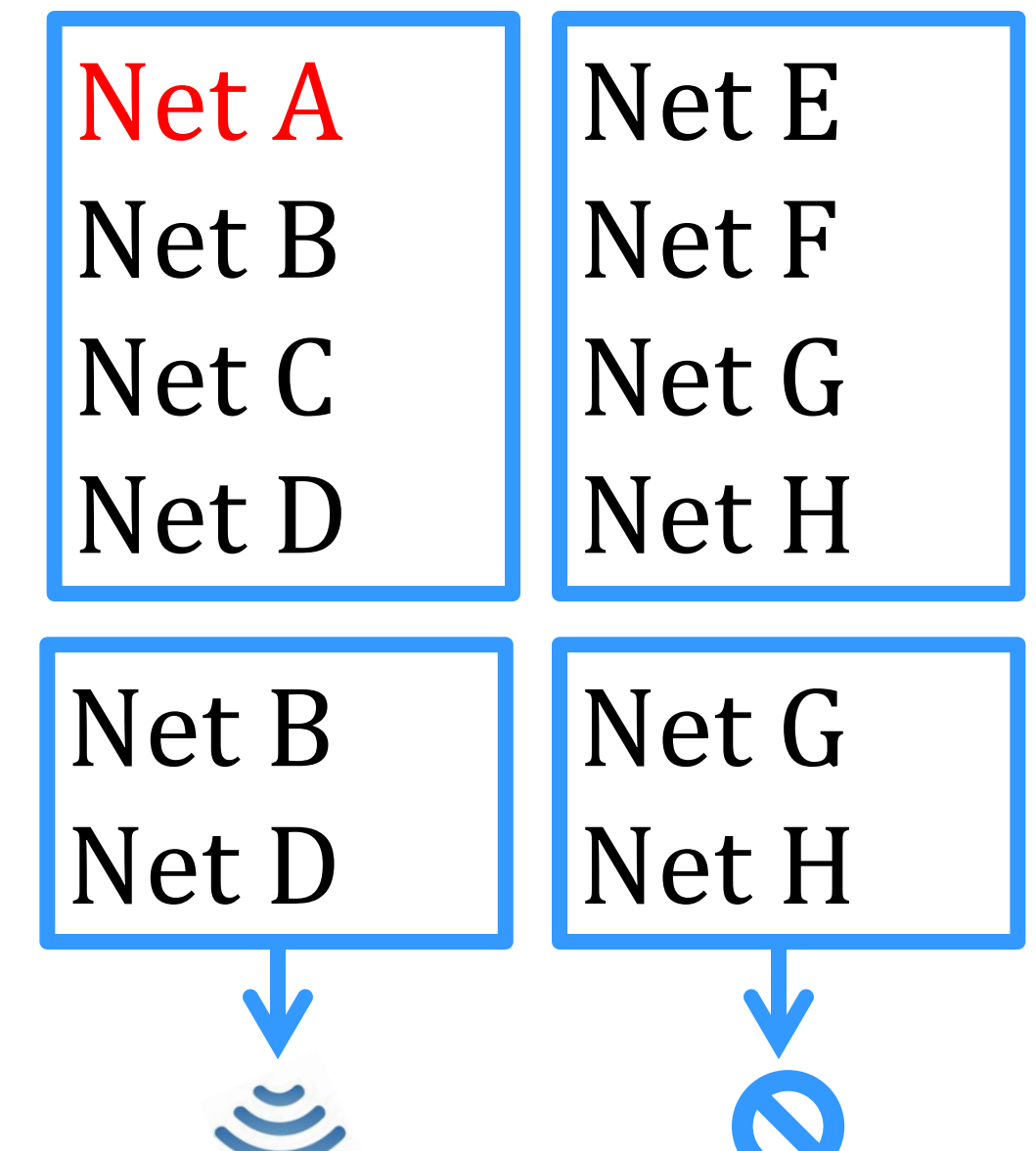


If the incomplete scanning results can imply the rest part of the scanning, the full process can be cut off.



Implementation

```
MC_TRACE("Wi-Fi: DISCOVERING", dev_name);
if (feature)
    return -EINVAL;
list = hlist_of(bufLen, GFP_KERNEL);
if (list)
    return -ENOMEM;
memset(list, 0, bufLen);
list->count = hto32(bufLen);
if (feature = dev_wlan_dev, WLAN_SCAN_RESULTS, list, bufLen); {
    MC_ERROR("Wi-Fi: Scan results error %d\n", __LINE__, error);
    kfree(list);
    return error;
}
list->bufLen = hto32(list->bufLen);
list->version = hto32(list->version);
list->count = hto32(list->count);
if (list->version != WLAN_SCAN_VERSION) {
    MC_ERROR("Wi-Fi: Scan version %d != WLAN_SCAN_VERSION\n",
            __FUNCTION__, list->version);
    kfree(list);
    return -EINVAL;
}
for (i = 0; devq-length = 0; i < list->count; devq-length = IN_MAX_AP, i++) {
    h = h & 0xffff;
    if ((h > 0xffff) && (h < 0)) {
        MC_ERROR("Wi-Fi: Scan results error %d\n", __FUNCTION__, hto32(h));
        return -EINVAL;
    }
    if ((h > 0xffff) && (h < 0)) {
        MC_ERROR("Wi-Fi: Scan results error %d\n", __FUNCTION__, hto32(h));
        return -EINVAL;
    }
    if ((h > 0xffff) && (h < 0)) {
        continue;
    }
    memcpy(addr[devq-length], h_data, h & 0xffff);
    addr[devq-length].sa_family = AF_INET;
    qual[devq-length].qual = 0;
    qual[devq-length].level = 0;
    qual[devq-length].noise = 0;
    qual[devq-length].noise = 0;
}
```



By modifying wireless driver source code, we stop the Wi-Fi scanning in the middle. Once we get the partial results, we adopt a prediction model on them, and make decisions on whether or not to continue.

For example, a user never connects to any network when the phone detects "WellsFargo" as one of the scanning results. Next time, once the phone detects "WellsFargo", it stops the rest part of the full scan and saves energy. In a contrary case, the scanning has to continue, but more often the results contain no available networks, so we don't really need them.