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PATIENT HEALTH MONITORING PRIORITIZATION

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ABSTRACT

Techniques are presented herein that provide a health care application (e.g., "Patient Inspection Prioritization" application) which utilizes existing wireless infrastructure to identify health instrument clients based on a provisioned group identifier (ID) field (e.g., a vendor element field) in an association request. A Wireless Local Area Network (LAN) Controller (WLC) may perform traffic handling to route this client-mapped traffic to the "Patient Inspection Prioritization" application. The application may perform operations associated with the implemented logic or analytics, thereby providing useful information to doctors before patient inspection/treatment. The group ID may be the same for the devices in same room and thus associated with a particular patient residing in that room. The group ID may be useful for applying policies on grouped clients in addition to health care analytics.

DETAILED DESCRIPTION

Wireless adoption is increasing in the healthcare industry and many healthcare instruments have Wi-Fi® capability. This provides an opportunity to utilize the Wi-Fi capability of co-related healthcare devices to benefit patients.

In developing countries having lower doctor-to-patient ratios, the number of patients typically in a hospital is large. Doctors are constantly challenged to spend enough time visiting patients. Doctors usually visit based on the location (e.g., room) where the patient is treated.

Ideally the doctor would, before visiting the patient during the regular checkup round, obtain real-time health conditions and a list of patients sorted based on criticality of condition and treatment need. Based on this sorted prioritized list, the doctor could make a

better (more informed/intelligent) decision as to the order in which he/she should visit patients.

This problem also occurs in developed countries during an epidemic or health hazard, but is in general more prominent in developing nations with high populations and high numbers of patients per hospital per doctor.

Accordingly, the techniques described herein provide a wireless-based solution (application) to solve this problem. In particular, this application addresses the problem faced in developing countries where patient to doctor ratios are very high by utilizing the Wi-Fi infrastructure. This is also applicable to developed countries in addition to areas where the doctor to patient ratio is low.

When health monitoring devices are installed in a hospital ward/room, they may be assigned (configured with) a group ID. In one example, devices in the same room may be assigned the same group ID. This group ID co-relates the data from different health monitoring devices so that a patient present in the room/ward is associated with consolidated/co-related health monitoring data obtained from different devices.

For example, the following Wi-Fi capable health monitoring instruments may capture the following health statistics:

- GLUCOSE
- WBC COUNT
- Red blood cell count
- Platelet count
- Creatinine
- ALANINE AMINOTRANSFERASE (ALT)
- POTASSIUM
- LDL (LOW DENSITY LIPOPROTEIN) CHOLESTEROL
- CHOLESTEROL
- HEMOGLOBIN A1C
- HDL
- Oxygen level
- Pulse rate
- Blood pressure

In one room, the parameter-capturing instruments are each initially configured with a group ID, which essentially represents the patient. Table 1 below illustrates the health statistics provided by the set of instruments represented by this group ID.

Parameter	**Patient 1 (Group Id 1) Value**	**Patient 2 (Group Id 2) Value**	**Ref Range**
GLUCOSE	80	**100**	60 - 99 mg/dL
WBC COUNT	4	**3**	3.5 - 12.5 K/uL
Red blood cells count	5	**4**	4.10 - 5.70 M/uL
Platelets count	142	**100**	140 - 400 K/uL
Creatinine	**1.4**	1	<=1.34 mg/dL
ALANINE AMINOTRANSFERASE (ALT)	44	45	0 - 47 U/L
POTASSIUM	4	4.5	3.5 - 5.3 mEq/L
LDL (LOW DENSITY LIPOPROTEIN) CHOLESTEROL	100	**160**	<=159 mg/dL
CHOLESTEROL	220	**250**	<=239 mg/dL
HEMOGLOBIN A1C	4	4.5	<=5.6 %
HDL	55	50	>=40 mg/dL
Total out of range Parameters	**1**	**6**	

Table 1

Wi-Fi capable clients (health monitoring instruments) may send the group ID when connecting to an Access Point (AP) or Wireless Local Area Network (LAN) Controller (WLC) in the association request (e.g., as a vendor ID field). Upon receiving this optional vendor ID field, the WLC determines the health monitoring instrument(s) and any special treatment required to be performed.

WLC routes the traffic of the devices to the application ("Patient Inspection Prioritization application") implemented at a network management entity, where the data sent by these devices may be co-related. The co-relation may be performed based on the

group ID, since the health instruments may have a specific format of packets containing health information data starting with the group ID.

The Patient Inspection Prioritization application may parse the traffic/packets sent by these instruments to prepare a report. The report may show which parameters for a particular patient/group ID/room are out of range.

Based on the count of "out of range" parameters, the application may determine the order of patient visitation. For example, in Table 1 above, patient 2 has six out-of-range parameters, whereas patient 1 has only one. Thus, the application dashboard displays the order for doctor visitation as patient 2 (group ID 2), and then patient 1 (group ID 1).

Therefore, even if the doctor is physically closer to patient 1 than patient 2, the doctor may intelligently visit patient 2 first. If multiple patients have the same number of out-of-range parameters, the doctor may visualize the real time data to determine which patient is more critical and visit that patient first.

Accordingly, the Patient Inspection Prioritization application may perform several functions. First, the application may analyze packets send by clients (routed by WLC) and form sets of data output based on the group ID. Second, the application may interpret traffic output from different instruments and map the patient to the configured ranges. Third, the application may populate a "total out of range" parameter list for each group ID and sort them in descending order. If this value is high (or low), the patient is assigned a corresponding high (or low) priority. Fourth, the application present a User Interface (UI) based dashboard indicating room number (group ID) ordering for the doctor to visit before performing the regular patient inspection visits.

This may be further extended to sending alarms/notifications to doctors not only during regular visits for all patients but also anytime if the number of "out of range" parameters exceed a configured threshold (e.g., for any patient that has, for example, 50% out of range parameters). Therefore, this may be used in addition to regular checks as an additional data point for providing better patient care.

Grouping wireless clients may also be used in other applications for performing enterprise analytics and policy application on a set of clients.

Figure 1 below illustrates example communications between various entities implementing the approach described herein.

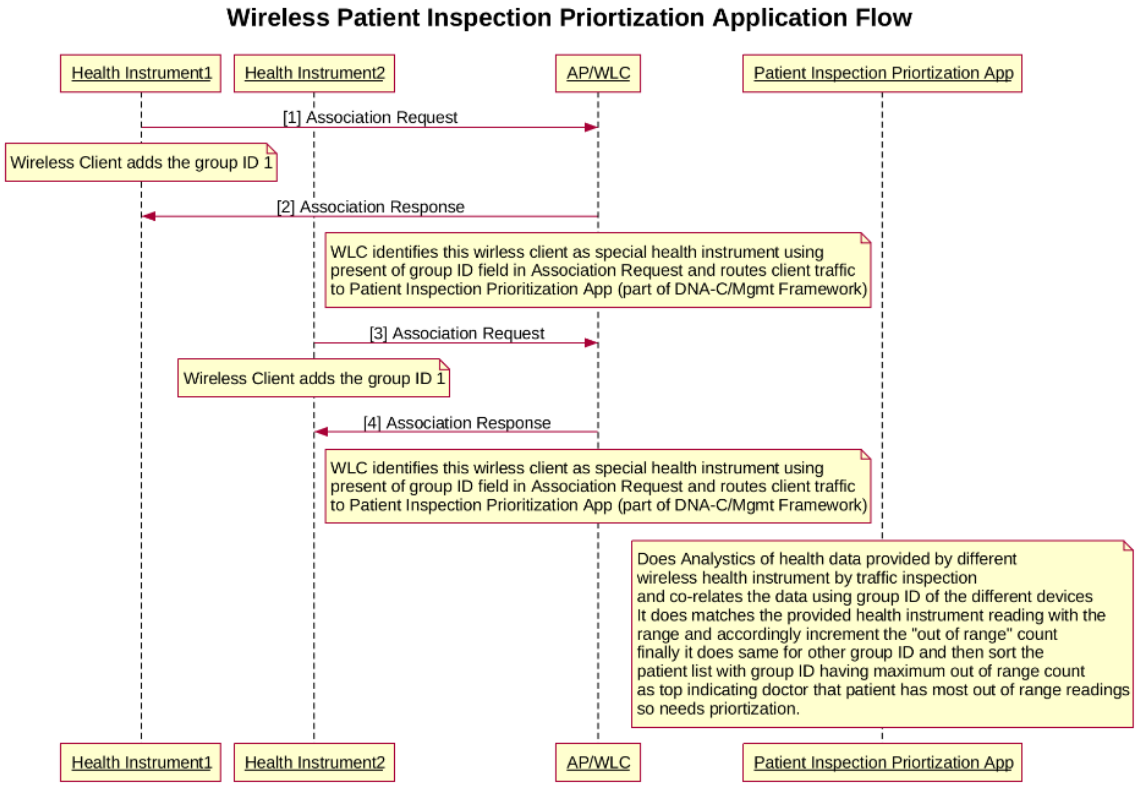

Figure 1

Instead of routing all traffic to the application, only select traffic (based on group ID) is routed to avoid impacting performance. Additionally, the group ID may be applied to policy applications on a set of wireless clients as well as analytics. This has broader applications than solely for health care.

Provided herein is a dashboard and an algorithm for health care deployment in which doctors receive a sorted list based on patient urgency. An optional vendor ID may be used to take into consideration client complexity. Since many health care instruments currently have Wi-Fi capability, this approach is easy to adapt in existing systems.

In summary, techniques are presented herein that provide a health care application (e.g., “Patient Inspection Prioritization” application) which utilizes existing wireless infrastructure to identify health instrument clients based on a provisioned group ID field (e.g., a vendor element field) in an association request. A WLC may perform traffic handling to route this client-mapped traffic to the “Patient Inspection Prioritization”

application. The application may perform operations associated with the implemented logic or analytics, thereby providing useful information to doctors before patient inspection/treatment. The group ID may be the same for the devices in same room and thus associated with a particular patient residing in that room. The group ID may be useful for applying policies on grouped clients in addition to health care analytics.