BCPR203 Database Management Systems

Assignment One:

Signal Tester Log Database Analysis

for Vector Advanced Metering Services (AMS)

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# Introduction

antennaTestType ENUM('Blade', 'Whip', 'Blade&Whip'), the test equipment has ability to test blade and whip antennas at the same. Although vector has not tested both antennas at the same time, there are possibility that vector will test both antennas at the same time in the future. Therefore, a data of 'Blade&Whip' is included in the ENUM of antennaTestType attribute in Test Table

A constraint of NOT NULL AUTO\_INCREMENT was added in the attributes such as thresholdId in Threshold Table, testId in Test Table and BtSigId in BluetoothSignal Table. A constraint of NOT NULL was added in the attributes testId in Test Table (not auto-increment for prevent mis-match between PK and FK).

A constraint of NOT NULL was added in the attributes testId in Test Table and Job Table.

The attribute testId in Job Table was set to be Unique Key, Foreign Key and part of the composite primary key.

All PK and FK and UK are set as NOT NULL.

# Version Control

All the information produced by this report is kept under a GitHub, which is a version control system, in a repository <https://github.com/harrykhlo/DatabaseAnalysis> for your reference.

In the repository, this report is in HarryBCPR203AssignmentReport.docx; ??????????????????????????????????

# Data Cleansing

There were some incorrect and inaccurate data in the given logfiles, so data cleansing was conducted to modify the corresponding data in order to improve the data integrity in the new database I build in this report. The incorrect or inaccurate data (at left-hand-side of the Table 1) found in the logfiles as well as the corresponding amendments (at left-hand-side of the Table 1) are given in the Table 1 below.

Table 1: Data Cleansing Records

|  |  |  |
| --- | --- | --- |
|  | Incorrect or inaccurate data in given logfiles. | Amended data for building new database. |
| 1 | The value gave at 5th item in logfiles (i.e. Antenna Test Type: Blade and/or Whip). | The value of this item should be either Blade or Whip. This report corrected this value by using the modem status in 60th to 64th item. |
| 2 | Signal Results at 6th to 10th item in the logfile showed fail even if the corresponding test was not conducted or network was unregistered. | The incorrect-fail value of these items was changed to “NotTested” or “Unregistered” in according to modem status in 60th to 64th item. |
| 3 | The header name, Signal Result Telstra Blade, at 9th item of the logfile. | This header name was change Signal Result Telstra Whip instead of Blade. |
| 4 | Some zero values at RSSI, RSCP & RSRP items (i.e. 11th to 25th item in logfiles) were not a genuine zero reading. | The RSSI, RSCP & RSRP items are calculated by using Raw Arrays at 42nd to 47th item in logfiles. The ungenuine-zero values at RSSI, RSCP & RSRP items were changed to NULL if the corresponding Raw Array is blank. |
| 5 | For the RSSI, RSCP & RSRP items (i.e. 11th to 25th item in logfiles), client required to round the numerical values to 2 decimal points. | All the valid values were rounded to 2 decimal points. |
| 6 | Some false values at Timeout items (i.e. 32nd to 36th item in logfiles) were not a genuine false value. | Some values of False were not because the tests got False but because the tests were not conducted. The ungenuine-False values were changed to Null. |
| 7 | The Unknown values at Network items (i.e. 37th to 40th item in logfiles) did not reflect the correct situation. | Some Unknown values implied it was not tested; some represented a known network was denied or unable to be registered. The improper Unknown values were changed to NULL or Unregistered for a not-tested case or an unable-registered network respectively in according to the Modem Status items (i.e. 60th to 64th item of logfiles). |
| 8 | Empty arrays [] at the Raw Array items (i.e. 42nd to 46th item of logfiles) were because the tests were not conducted or not able to be conducted. | These empty arrays can be ignored without input in the new database designed in this report. (see the RawData Table in the following Sections). |
| 9 | 16 data were found in the Raw Array (i.e. 42nd to 46th item of logfiles) in 2.txt file and 5.txt file. | This is just a note for noticing the inconsistent number of data. In according to client information, this should be either 15 or 30 data. However. It is not sure if it would need to modified or not. |
| 10 | Frequency number I in Raw Array (i.e. 42nd to 46th item of logfiles) does not have a corresponding frequency band. | The data of frequency band for the frequency number was temporarily given to be NotGiven which will be corrected it once the correct frequency is clarify. |
| 11 | Blank GPS Long and Blank GPS Lat items (i.e. 48th to 49th item of logfiles) were found. | The blank values were changed to NULL. |
| 12 | Blank SIM items (52nd to 54th item of logfiles) were found. | The blank values represented there is no SIM used, so the blank values were changed to NULL. |
| 13 | Blank Modem Status items (60th to 64th item of logfiles) were found. | The blank values represented there is no modem used, so the blank values were changed to NULL. |

# Database Normalisation

## First Normalised Form

### Primary Key

A composite primary key consisting of the Bluetooth Name, the Work Order and the Date is chosen to represent an entire individual signal tester logfile. For convenient propose, a primary key named JobId is introduced to represent this composite key. The representatives (Andy and Marco, named representatives hereinafter) from Vector mentioned that the Bluetooth Name in the logfile is unique and the combination of the Work Order and Date in the logfile is unique too.

### Partial Dependency

### Transitive Dependency

## 2nd Normalised Form

## 3rd Normalised Form

# Entity Relationship Diagram

## Identify Entity Relationship

## Data Dictionary

# Suggestions

dataNature attribute in the RawData Table is a composite attribute can be separated, then the database size can be reduced.

Logfiles after Data Cleansing (corrected data are highlighted in yellow)

Logfile: 1.txt

User Name: Eevee

Work Order: WO-00251301

Bluetooth Name: REAPER

Date: 19-2-2019--13-14

Antenna Test Type: Blade

Signal Result Vodafone Blade: Denied

Signal Result Vodafone Whip: NotTested

Signal Result Telstra Blade: Pass

Signal Result Telstra Whip: NotTested

Signal Result External Modem: NotTested

RSSI Vodafone Blade: NULL

RSSI Vodafone Whip: NULL

RSSI Telstra Blade: NULL

RSSI Telstra Whip: NULL

RSSI External Modem: NULL

RSCP Vodafone Blade: NULL

RSCP Vodafone Whip: NULL

RSCP Telstra Blade: NULL

RSCP Telstra Whip: NULL

RSCP External Modem: NULL

RSRP Vodafone Blade: NULL

RSRP Vodafone Whip: NULL

RSRP Telstra Blade: 61.13

RSRP Telstra Whip: NULL

RSRP External Modem: NULL

RSSI Threshold: 6.0

RSSI Higher Threshold: 12.0

RSCP Threshold: 15.0

RSCP Higher Threshold: 30.0

RSRP Threshold: 10.0

RSRP Higher Threshold: 20.0

Timeout Vodafone Blade: True

Timeout Vodafone Whip: NULL

Timeout Telstra Blade: False

Timeout Telstra Whip: NULL

Timeout External Modem: NULL

Network Vodafone Blade: Denied

Network Vodafone Whip: NULL

Network Telstra Blade: "Telstra Mobile"

Network Telstra Whip: NULL

Network External Modem: NULL

Raw Array Vodafone Blade: Ignored (not going to insert into database)

Raw Array Vodafone Whip: Ignored (not going to insert into database)

Raw Array Telstra Blade: ["58\_12-6", "61\_19-6", "61\_30-6", "61\_30-6", "62\_30-6", "62\_32-6", "62\_32-6", "61\_26-6", "61\_26-6", "61\_30-6", "61\_29-6", "61\_21-6", "62\_27-6", "62\_27-6", "61\_31-6"]

Raw Array Telstra Whip: Ignored (not going to insert into database)

Raw Array External Modem: Ignored (not going to insert into database)

BT Signal: [-59.0, -52.0]

GPS Long : NULL

GPS Lat: NULL

GPS Accuracy: kCLLocationAccuracyKilometer

Device Type: iPad6,12

SIM Vodafone: 89314404000248157530

SIM Telstra: 89610180002243817774

SIM External: NULL

Serial No: SDS-196B

Firmware No: GAT-17R3

App Version No: 2.2.5

Battery Level: 3.92

Modem Type: EWM400

Modem Status Vodafone Blade: Registeration Denied

Modem Status Vodafone Whip: NULL

Modem Status Telstra Blade: Registered, home network

Modem Status Telstra Whip: NULL

Modem Status External: NULL

Logfile: 2.txt

User Name: Pikachu

Work Order: WO-00104116

Bluetooth Name: CORSSRAY

Date: 1-5-2018--8-5

Antenna Test Type: Blade

Signal Result Vodafone Blade: Pass

Signal Result Vodafone Whip: NotTested

Signal Result Telstra Blade: Pass

Signal Result Telstra Whip: NotTested

Signal Result External Modem: NotTested

RSSI Vodafone Blade: NULL

RSSI Vodafone Whip: NULL

RSSI Telstra Blade: NULL

RSSI Telstra Whip: NULL

RSSI External Modem: NULL

RSCP Vodafone Blade: 14.65

RSCP Vodafone Whip: NULL

RSCP Telstra Blade: 20.5

RSCP Telstra Whip: NULL

RSCP External Modem: NULL

RSRP Vodafone Blade: 23.08

RSRP Vodafone Whip: NULL

RSRP Telstra Blade: 21.77

RSRP Telstra Whip: NULL

RSRP External Modem: NULL

RSSI Threshold: 6.0

RSSI Higher Threshold: 12.0

RSCP Threshold: 15.0

RSCP Higher Threshold: 30.0

RSRP Threshold: 10.0

RSRP Higher Threshold: 20.0

Timeout Vodafone Blade: False

Timeout Vodafone Whip: NULL

Timeout Telstra Blade: False

Timeout Telstra Whip: NULL

Timeout External Modem: NULL

Network Vodafone Blade: "vodafone AU"

Network Vodafone Whip: NULL

Network Telstra Blade: "Telstra Mobile"

Network Telstra Whip: NULL

Network External Modem: NULL

Raw Array Vodafone Blade: ["39\_33-1", "39\_33-1", "39\_37-1", "99\_99-0", "99\_99-0", "99\_99-0", "99\_99-0", "99\_99-0", "40\_18-4", "40\_18-4", "40\_18-4", "39\_29-4", "39\_23-4", "39\_23-4", "40\_29-4"]

Raw Array Vodafone Whip: Ignored (not going to insert into database)

Raw Array Telstra Blade: ["41\_33-2", "41\_33-2", "41\_33-2", "99\_99-0", "99\_99-0", "99\_99-0", "28\_6-4", "29\_6-4", "29\_6-4", "28\_4-4", "28\_7-4", "27\_2-4", "28\_6-4", "29\_11-4", "29\_11-4", "28\_7-4"]

Raw Array Telstra Whip: Ignored (not going to insert into database)

Raw Array External Modem: Ignored (not going to insert into database)

BT Signal: [-76.0, -72.0, -66.0]

GPS Long :152.752432376289

GPS Lat: -27.6047716895375

GPS Accuracy: kCLLocationAccuracyKilometer

Device Type: iPad Air

SIM Vodafone: 89314404000248186935

SIM Telstra: 89610180002249048341

SIM External: NULL

Serial No: SDS-043C

Firmware No: GAT-17R3

App Version No: 2.2.5

Battery Level: 3.92

Modem Type: EWM400

Modem Status Vodafone Blade: Registered, Roaming

Modem Status Vodafone Whip: NULL

Modem Status Telstra Blade: Registered, home network

Modem Status Telstra Whip: NULL

Modem Status External: NULL

Logfile: 3.txt

User Name: Celebi

Work Order: WO-00105349

Bluetooth Name: DIXIE

Date: 30-4-2018--14-48

Antenna Test Type: Blade

Signal Result Vodafone Blade: Denied

Signal Result Vodafone Whip: NotTested

Signal Result Telstra Blade: Pass

Signal Result Telstra Whip: NotTested

Signal Result External Modem: NotTested

RSSI Vodafone Blade: NULL

RSSI Vodafone Whip: NULL

RSSI Telstra Blade: NULL

RSSI Telstra Whip: NULL

RSSI External Modem: NULL

RSCP Vodafone Blade: NULL

RSCP Vodafone Whip: NULL

RSCP Telstra Blade: 27.2

RSCP Telstra Whip: NULL

RSCP External Modem: NULL

RSRP Vodafone Blade: NULL

RSRP Vodafone Whip: NULL

RSRP Telstra Blade: NULL

RSRP Telstra Whip: NULL

RSRP External Modem: NULL

RSSI Threshold: 6.0

RSSI Higher Threshold: 12.0

RSCP Threshold: 15.0

RSCP Higher Threshold: 30.0

RSRP Threshold: 10.0

RSRP Higher Threshold: 20.0

Timeout Vodafone Blade: True

Timeout Vodafone Whip: NULL

Timeout Telstra Blade: False

Timeout Telstra Whip: NULL

Timeout External Modem: NULL

Network Vodafone Blade: Denied

Network Vodafone Whip: NULL

Network Telstra Blade: "Telstra Mobile"

Network Telstra Whip: NULL

Network External Modem: NULL

Raw Array Vodafone Blade: Ignored (not going to insert into database)

Raw Array Vodafone Whip: Ignored (not going to insert into database)

Raw Array Telstra Blade: ["28\_31-2", "26\_27-2", "26\_27-2", "26\_25-2", "26\_25-2", "26\_25-2", "25\_27-2", "25\_27-2", "28\_31-2", "28\_31-2", "28\_31-2", "30\_29-2", "30\_29-2", "25\_25-2", "25\_25-2", "25\_25-2", "26\_29-2", "26\_29-2", "26\_29-2", "28\_29-2", "28\_29-2", "28\_29-2", "28\_29-2", "28\_29-2", "29\_31-2", "29\_31-2", "28\_31-2", "28\_31-2", "28\_31-2", "29\_31-2"]

Raw Array Telstra Whip: Ignored (not going to insert into database)

Raw Array External Modem: Ignored (not going to insert into database)

BT Signal: [-83.0, -74.0, -79.0]

GPS Long :139.34259429587

GPS Lat: -35.6776790181507

GPS Accuracy: kCLLocationAccuracyKilometer

Device Type: iPad Air

SIM Vodafone: 89314404000266650267

SIM Telstra: 89610180002249046930

SIM External: NULL

Serial No: SDS-061C

Firmware No: GAT-17R3

App Version No: 2.2.5

Battery Level: 3.88

Modem Type: EWM400

Modem Status Vodafone Blade: Not Registered, searching for network

Modem Status Vodafone Whip: NULL

Modem Status Telstra Blade: Registered, home network

Modem Status Telstra Whip: NULL

Modem Status External: NULL

Logfile: 4.txt

User Name: Snorlax

Work Order: WO-00110610

Bluetooth Name: ASSAM

Date: 17-4-2018--10-41

Antenna Test Type: Blade

Signal Result Vodafone Blade: NotTested

Signal Result Vodafone Whip: NotTested

Signal Result Telstra Blade: NotTested

Signal Result Telstra Whip: NotTested

Signal Result External Modem: Pass

RSSI Vodafone Blade: NULL

RSSI Vodafone Whip: NULL

RSSI Telstra Blade: NULL

RSSI Telstra Whip: NULL

RSSI External Modem: 9.0

RSCP Vodafone Blade: NULL

RSCP Vodafone Whip: NULL

RSCP Telstra Blade: NULL

RSCP Telstra Whip: NULL

RSCP External Modem: NULL

RSRP Vodafone Blade: NULL

RSRP Vodafone Whip: NULL

RSRP Telstra Blade: NULL

RSRP Telstra Whip: NULL

RSRP External Modem: NULL

RSSI Threshold: 6.0

RSSI Higher Threshold: 12.0

RSCP Threshold: 15.0

RSCP Higher Threshold: 30.0

RSRP Threshold: 10.0

RSRP Higher Threshold: 20.0

Timeout Vodafone Blade: NULL

Timeout Vodafone Whip: NULL

Timeout Telstra Blade: NULL

Timeout Telstra Whip: NULL

Timeout External Modem: False

Network Vodafone Blade: NULL

Network Vodafone Whip: NULL

Network Telstra Blade: NULL

Network Telstra Whip: NULL

Network External Modem: "vodafone AU"

Raw Array Vodafone Blade: Ignored (not going to insert into database)

Raw Array Vodafone Whip: Ignored (not going to insert into database)

Raw Array Telstra Blade: Ignored (not going to insert into database)

Raw Array Telstra Whip: Ignored (not going to insert into database)

Raw Array External Modem: ["9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I", "9\_99-I"]

BT Signal: [-91.0, -87.0, -81.0, -70.0, -86.0, -74.0, -76.0]

GPS Long :152.984367638172

GPS Lat: -27.4171041995673

GPS Accuracy: kCLLocationAccuracyKilometer

Device Type: iPad6,12

SIM Vodafone: NULL

SIM Telstra: NULL

SIM External: 89314404000266723023

Serial No: SDS-008C

Firmware No: GAT-17R3

App Version No: 2.2.5

Battery Level: 3.94

Modem Type: EWM1000

Modem Status Vodafone Blade: NULL

Modem Status Vodafone Whip: NULL

Modem Status Telstra Blade: NULL

Modem Status Telstra Whip: NULL

Modem Status External: Registered, Roaming

Logfile: 5.txt

User Name: Charizard

Work Order: WO-00110925

Bluetooth Name: DAIBRAVE

Date: 26-4-2018--10-31

Antenna Test Type: Blade

Signal Result Vodafone Blade: Pass

Signal Result Vodafone Whip: NotTested

Signal Result Telstra Blade: Pass

Signal Result Telstra Whip: NotTested

Signal Result External Modem: NotTested

RSSI Vodafone Blade: NULL

RSSI Vodafone Whip: NULL

RSSI Telstra Blade: NULL

RSSI Telstra Whip: NULL

RSSI External Modem: NULL

RSCP Vodafone Blade: 12.0

RSCP Vodafone Whip: NULL

RSCP Telstra Blade: 16.4

RSCP Telstra Whip: NULL

RSCP External Modem: NULL

RSRP Vodafone Blade: 26.92

RSRP Vodafone Whip: NULL

RSRP Telstra Blade: 30.79

RSRP Telstra Whip: NULL

RSRP External Modem: NULL

RSSI Threshold: 6.0

RSSI Higher Threshold: 12.0

RSCP Threshold: 15.0

RSCP Higher Threshold: 30.0

RSRP Threshold: 10.0

RSRP Higher Threshold: 20.0

Timeout Vodafone Blade: False

Timeout Vodafone Whip: NULL

Timeout Telstra Blade: False

Timeout Telstra Whip: NULL

Timeout External Modem: NULL

Network Vodafone Blade: "vodafone AU"

Network Vodafone Whip: NULL

Network Telstra Blade: "Telstra Mobile"

Network Telstra Whip: NULL

Network External Modem: NULL

Raw Array Vodafone Blade: ["42\_43-1", "42\_43-1", "99\_99-0", "99\_99-0", "99\_99-0", "99\_99-0", "99\_99-0", "41\_17-4", "41\_17-4", "43\_22-4", "45\_24-4", "45\_26-4", "45\_23-4", "45\_24-4", "45\_24-4"]

Raw Array Vodafone Whip: Ignored (not going to insert into database)

Raw Array Telstra Blade: ["41\_37-2", "41\_39-2", "99\_99-0", "99\_99-0", "99\_99-0", "37\_22-4", "40\_21-4", "43\_26-4", "39\_23-4", "38\_9-4", "38\_9-4", "38\_7-4", "42\_26-4", "37\_26-4", "40\_26-4", "39\_26-4"]

Raw Array Telstra Whip: Ignored (not going to insert into database)

Raw Array External Modem: Ignored (not going to insert into database)

BT Signal: [-76.0, -69.0, -69.0, -76.0, -73.0, -76.0]

GPS Long :153.024695282944

GPS Lat: -27.1806907654062

GPS Accuracy: kCLLocationAccuracyKilometer

Device Type: iPad7,2

SIM Vodafone: 89314404000248233075

SIM Telstra: 89610180002249047685

SIM External: NULL

Serial No: SDS-049C

Firmware No: GAT-17R3

App Version No: 2.2.5

Battery Level: 3.69

Modem Type: EWM400

Modem Status Vodafone Blade: Registered, Roaming

Modem Status Vodafone Whip: NULL

Modem Status Telstra Blade: Registered, home network

Modem Status Telstra Whip: NULL

Modem Status External: NULL

Logfile: 6.txt

User Name: Mewtwo

Work Order: WO-00248593

Bluetooth Name: CARIVOU

Date: 19-2-2019--8-42

Antenna Test Type: Blade

Signal Result Vodafone Blade: Denied

Signal Result Vodafone Whip: NotTested

Signal Result Telstra Blade: Pass

Signal Result Telstra Blade: NotTested

Signal Result External Modem: NotTested

RSSI Vodafone Blade: NULL

RSSI Vodafone Whip: NULL

RSSI Telstra Blade: NULL

RSSI Telstra Whip: NULL

RSSI External Modem: NULL

RSCP Vodafone Blade: NULL

RSCP Vodafone Whip: NULL

RSCP Telstra Blade: NULL

RSCP Telstra Whip: NULL

RSCP External Modem: NULL

RSRP Vodafone Blade: NULL

RSRP Vodafone Whip: NULL

RSRP Telstra Blade: 46.07

RSRP Telstra Whip: NULL

RSRP External Modem: NULL

RSSI Threshold: 6.0

RSSI Higher Threshold: 12.0

RSCP Threshold: 15.0

RSCP Higher Threshold: 30.0

RSRP Threshold: 10.0

RSRP Higher Threshold: 20.0

Timeout Vodafone Blade: True

Timeout Vodafone Whip: NULL

Timeout Telstra Blade: False

Timeout Telstra Whip: NULL

Timeout External Modem: NULL

Network Vodafone Blade: Denied

Network Vodafone Whip: NULL

Network Telstra Blade: "Telstra Mobile"

Network Telstra Whip: NULL

Network External Modem: NULL

Raw Array Vodafone Blade: Ignored (not going to insert into database)

Raw Array Vodafone Whip: Ignored (not going to insert into database)

Raw Array Telstra Blade: ["43\_19-6", "43\_19-6", "47\_23-6", "47\_23-6", "47\_18-6", "47\_18-6", "46\_19-6", "46\_19-6", "46\_19-6", "44\_12-6", "47\_26-6", "47\_23-6", "47\_25-6", "47\_28-6", "47\_28-6"]

Raw Array Telstra Whip: Ignored (not going to insert into database)

Raw Array External Modem: Ignored (not going to insert into database)

BT Signal: [-76.0, -85.0]

GPS Long :152.971914761231

GPS Lat: -27.0792295037818

GPS Accuracy: kCLLocationAccuracyKilometer

Device Type: iPad Air

SIM Vodafone: 89314404000281178914

SIM Telstra: 89610180002249045296

SIM External: NULL

Serial No: SDS-026C

Firmware No: GAT-17R3

App Version No: 2.2.5

Battery Level: 3.88

Modem Type: EWM400

Modem Status Vodafone Blade: Registeration Denied

Modem Status Vodafone Whip: NULL

Modem Status Telstra Blade: Registered, home network

Modem Status Telstra Whip: NULL

Modem Status External: NULL