FUNCTIONAL SPECIFICATION DOCUMENT 8: DEPOT/SERVER SOFTWARE SPECIFICATIONS

FOR

THE SUPPLY AND INSTALLATION OF DATA LOGGING

AND

AUTOMATIC BUS STOP ANNOUNCEMENT SYSTEM

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FOR CITYBUS LIMITED

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0. DOCUMENT CONTROL INFORMATION

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AMENDMENT HISTORY

Issue	Date	Change Description	Originated by	Approved by
1.0	29/01/2008	First Draft Issue for Comment	Tara Nair	

1   INTRODUCTION

This document describes the functionality of the Bus Depot Computer (BDC) and the Main Server.

2   BUS DEPOT COMPUTER (BDC) FUNCTIONALITY

2.1   BDC Description

The Bus Depot Computer (BDC) is used to collect the data locally for each bus that passes through the depot. It supports manual download with SDcards or USB Flash Discs or download through the BDC WLAN. The BDC then sends the data through to the Main Server, using the CTB WAN, for storage and further processing.

Each depot will have a number of WiFi access points together forming the BDC WLAN. Each access point will be capable of handling simultaneous transmission between 5 buses with an individual bus taking no more than 45 seconds to download its daily data. When an IVU comes into range of a BDC WLAN access point it detect and validates the networks SSID against its list of approved SSIDs and automatically attempts to connect to the network if the SSID is valid.

The access points connect via the BDC LAN to the BDC for collection of the log data, and for distribution of BSA update files and parameter updates. The BDC WLAN uses WPA-PSK to protect the network from unauthorized access and the BDC and IVU use SSH for their communications link; security keys for these protocols are downloaded with the system parameters as required.

The BDC supports lossless download via the BDC WLAN with auto restart at any BDC should the file transfer be interrupted for any reason. It filters out any duplicate transmissions and writes data directly to the Main Server using IP addressing in CTB office over the CTB WAN connecting the BDC to the CTB Main Server. If the CTB WAN should disconnect for any reason, the BDC will store the data locally until the WAN is restored. Usually when data has been written to the Main Server the BDC data files are deleted but a software setting is provided to prevent this erasure and in this case the data is retained until the allocated storage is full at which point the oldest files are deleted on a daily basis.

2.2   Manual Download/Upload and Flash Disc Creation

The BDC can configure, at the request of an authorised user, an SCcard or USB Flash disc using the User Interface provided. The user selects the Bus ID and the function required which can be Upload/Download, IVU Flash Disc Creation or Create Survey Flash Disc.

If upload/download is selected then a security script is added to the card that confirms the bus identity and then requests the IVU to upload software and parameter changes and to download DL and ABSA Data from the IVU onto the card. This security script expires after 24 hours and only allows access to a particular bus. Once the card is written the card is inserted into the IVU. The updates any required software or files and then the IVU copies data onto the card but does not delete that data from the IVU. When the data has been copied the card is removed from the IVU and reinserted into any BDC. The BDC will download the data from the card and then the data is processed in the same way that data transmitted over the BDC WLAN is.

If IVU Flash Disc Creation is chosen then the BDC prompts for the Vehicle ID and then creates a Flash Disc with the latest software, parameters and ABSA tables ready for installation in the permanent Flash Disc slot in the IVU.

If Create Survey Flash Disc is chosen then the command file to put a particular Bus Unit into Survey Mode together with the RSS route data is loaded onto the Flash Disc. This can be used to collect Survey Information that can be loaded into the RDT.

2.3 BDC User Interface

The interface screen of the BDC has three sections allowing the upload/download process to be monitored at the BDC in real time:
Display received message from IVU – This displays messages that are received by the BDC from the IVU's

Display progress of uploaded files from IVU – This displays the upload/download status of for each IVU connected to the BDC via the Wireless LAN.
The interface screen of the BDC has three sections:
Display received message from IVU – This displays messages that are received by the BDC from the IVU's

Display progress of uploaded files from IVU – This displays the upload/download status of for each IVU connected to the BDC via the Wireless LAN.
The interface screen of the BDC has three sections:
Display received message from IVU area – This displays messages that are received by the BDC from the IVU's

Display progress of uploaded files from IVU area – This displays the upload/download status of for each IVU connected to the BDC via the Wireless LAN.
Display BDC status that shows five key information parameters:

| Message	Interpretation
Broadcast : 12000: 5 Seconds	Broadcast UDP message to IVU's port : 12000 at 5 seconds intervals
Server Online, Port : 80	IVU can send a file with HTTP format to BDC port 80
TCP Server Online, Port : 8080	IVU can make a TCP connection to BDC port 8080 to get update of logger or software
Database Connect : 60 seconds	Check the database connection every 60 seconds. If disconnected, it will show Database Disconnect.
Check Update : 120 Seconds	Check any software update for IVU at 120-second intervals. If database is disconnected, it will not check for a software update.

Although there is no requirement in normal operation to change these parameters they can be modified if required.

The BDC has been designed with a generalised file transfer capability; this allows future expansions to be added with additional data without fundamental BDC communications redesign.

The BDC sends an event for each bus communication session with the BDC to the Main Server allowing reports to be generated about the communications performance of the system, the event contains

- Time
- BDC_ID
- Bus_ID
- Data size to download
- Percentage of data actually downloaded
- Data size to upload
- Percentage of data size actually uploaded
- A flag to indicate that BDC connection to the IVU was interrupted.

These communications events can be logged to a file by the Frontline Operator if required.
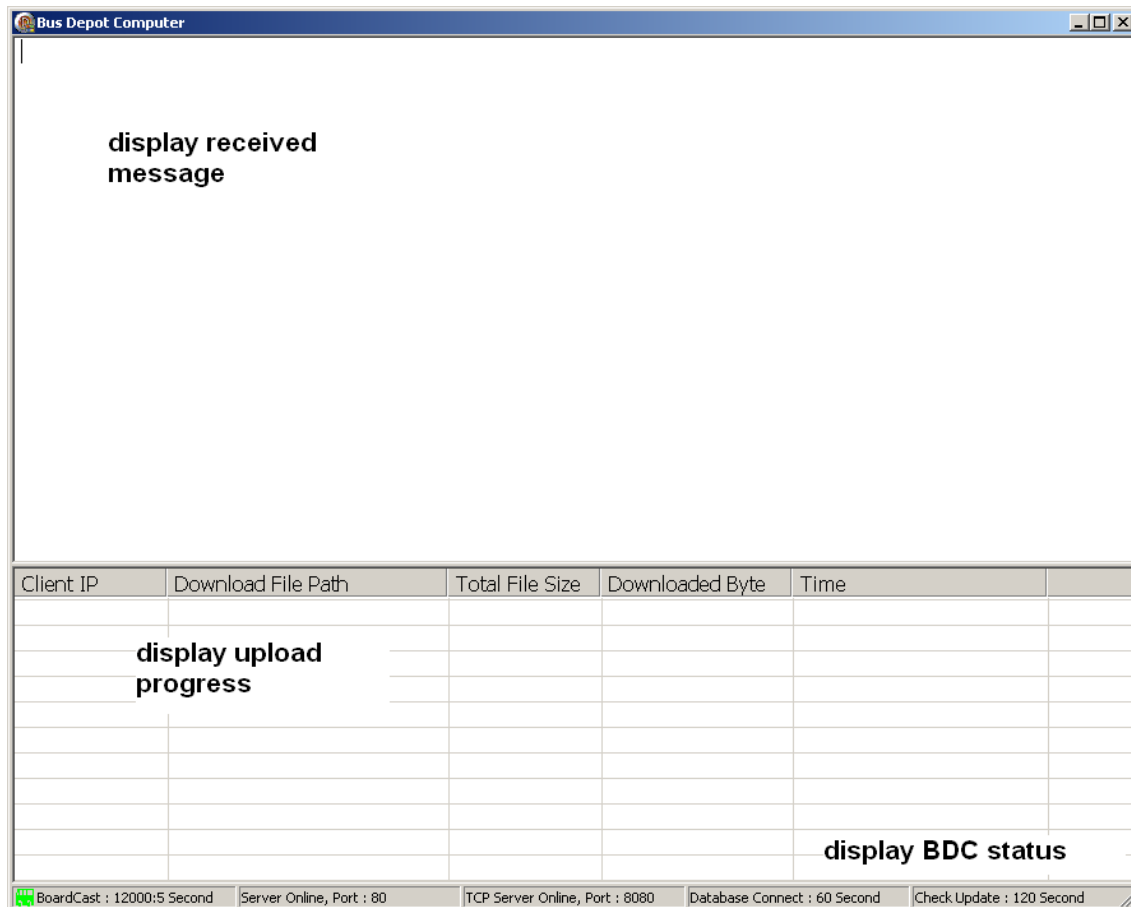
3 MAIN SERVER COMPUTER FUNCTIONALITY

3.1 Main Server Data

The Main Server and the MYSQL database it hosts, is the destination for all bus data collected. The normal path is via the BDC WLAN but data can also be retrieved from IVUs by manual collection. Data is sent to the Main Server via the CTB WAN from the BDCs at Bus Depots to the Main Server located in CTB Main Office.

The Main Server is sized to stored Event and Accident Logs for a minimum of 3 months and to store DDL data for a minimum of 2 weeks storage. The tables in which the data is stored have keys to facilitate the production of acceptable speed daily exception reports.

The Main Server hosts a password protected MySQL Database with Tables containing the following information:

Source	Data
IVU	DL Event Data

IVU	DL Detailed Data Log
IVU	ABSA Event Data
IVU	ABSA Location Log
BDC	Communications Events
System Parameter Tool	DL System Parameters
System Parameter Tool	ABSA Parameters
System Parameter Tool	System Parameters and Security Keys
RDT	ABSA Route Tables
CMT	ABSA Playlists
System Parameter Tool	Vehicle and IVU Data
System Parameter Tool	Links to updated IVU software

Unless Manual Download is used then all information is collected from the IVU or sent to the IVU via the BDC WLAN.

3.2   System Parameter Tool

The System Parameter Tool provides an editor to allow the parameters to be changed in the system. These parameter changes are linked to a timestamp with an activation time so that the changes occur at a particular time. If the parameters that are changed are required by the IVU then they are transmitted as an update file together with their activation time and the changes are made to the IVU at the appropriate time.

3.3   Remote Maintenance

The Main Server can be viewed and maintained using standard Windows Remote management tools providing access to the Main Server, via the CTB firewall, is made available to the maintenance team.

3.4   Additional of Bus Captain Data

In order for Events and DDL Data to be linked to the appropriate Bus Captain, the Main Server hosts a program that can read a file of Bus Captain Log On/Off data provided by CTB from the Octopus System. All data for a vehicle during the time the Bus Captain is logged on will be labelled with the Bus Captains ID. An error log is generated by the tool identifying incomplete Bus Captain Logon data. The Bus Captain files are put into the Bus Captain Log directory by CTB system operations staff and the file is automatically processed and a report file is generated.