



HF Controls

HF CONTROLS CONTROL SYSTEM

HFC-6000 Product Line Components

HFC-FPC08 G-Link Gateway
Software Design Specification

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Revision History

Date	Revision	Author	Changes
5/18/2015	A	E. Patrizi	Initial Release
3/21/2018	B	Tran Pham	Adapt to FCPUX changes (from Parallel to Hot Standby)
5/9/2018	C	Tran Pham	<ul style="list-style-type: none">Update flow chart (section 3.6.1.6, section 3.6.1.8, and section 3.6.3.2)Add section 3.6.3.3 to list all cases leading to failover

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1.0 SCOPE

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This document describes the technical software design for the HFC-FPC08 Gateway card.

2.0 REFERENCES

RS901-002-04	HFC-FPC08 FPGA Gateway Software Requirement Specification
DS002-000-01	C-Link Protocol Design Spec
DS001-007-01	HFC-6000 FPGA System Component Design Description
DS901-001-64	HFC-FCPUX FPGA Software Design Specification
DS901-002-14	HFC-FPC08 FPGA Gateway Firmware Design Specification
WI-ENG-203	Develop Software Design Specification

2.1 ABBREVIATIONS AND ACRONYMS

CRC	Cyclic Redundancy Check
DDB	Dynamic Database
FPGA	Field-Programmable Gate Array
I/O	Input/Output
LPC	Low Pin Count Connection Interface
ELPC	Ethernet Low Pin Count Connection Interface
TCP/IP	Transmission Control Protocol/Internet Protocol
UDP	User Datagram Protocol
USB	Universal Serial Bus

3.0 TECHNICAL DESIGN

3.1 SYSTEM ARCHITECTURE

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3.2 COMMUNICATION INTERFACES

3.2.1 Ethernet Interface

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3.2.2 USB Interface

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3.2.3 Keyboard/Mouse Interface

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3.2.4 Interface with FCPUX (G-Link)

The G-Link protocol is a HFC proprietary design used for general communications
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Refer to DS901-001-64, HFC-FCPUX FPGA Software Design Specification for detailed message protocol and operation.

3.3 TIMING REQUIREMENTS

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3.6.1 Design Description

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3.6.1.1 Security

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3.6.1.2 Power Up Initialization

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3.6.1.3 Application/Configuration Update

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3.6.1.4 appGenCrc

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3.6.1.5 firmGenCrc

[

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3.6.1.6 Sanity

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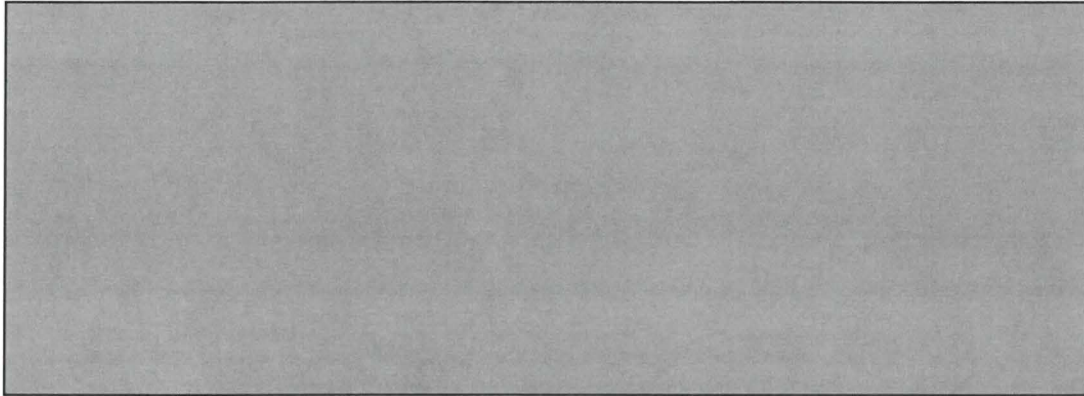


Table 1 – Status Mailbox Bit Definitions

[

] Refer to Figure 1.

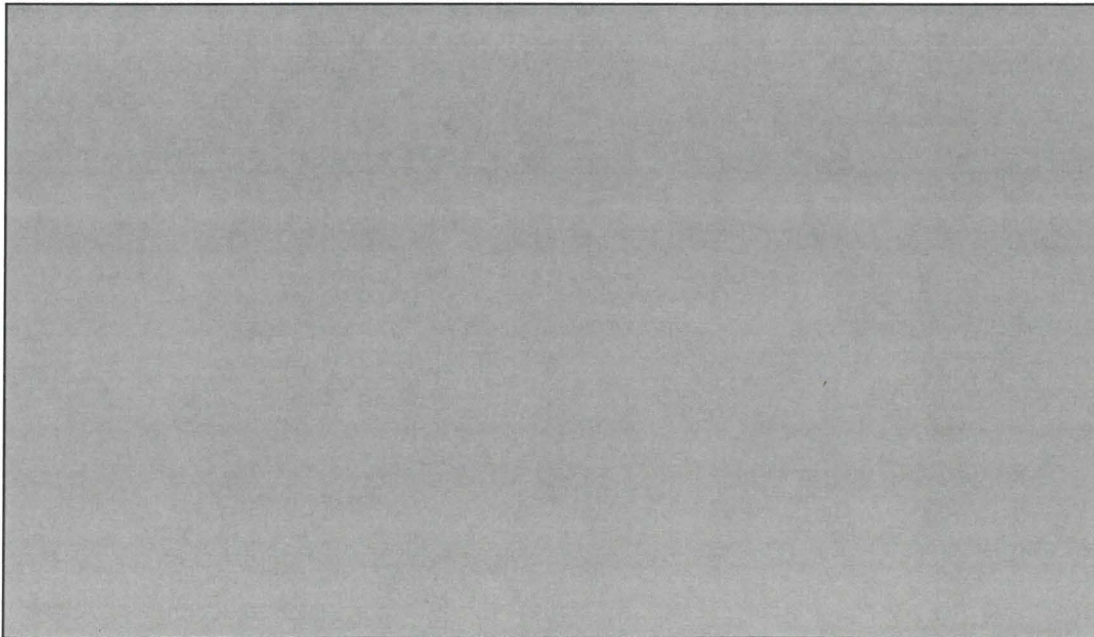


Figure 1 – Keep Alive Mailbox

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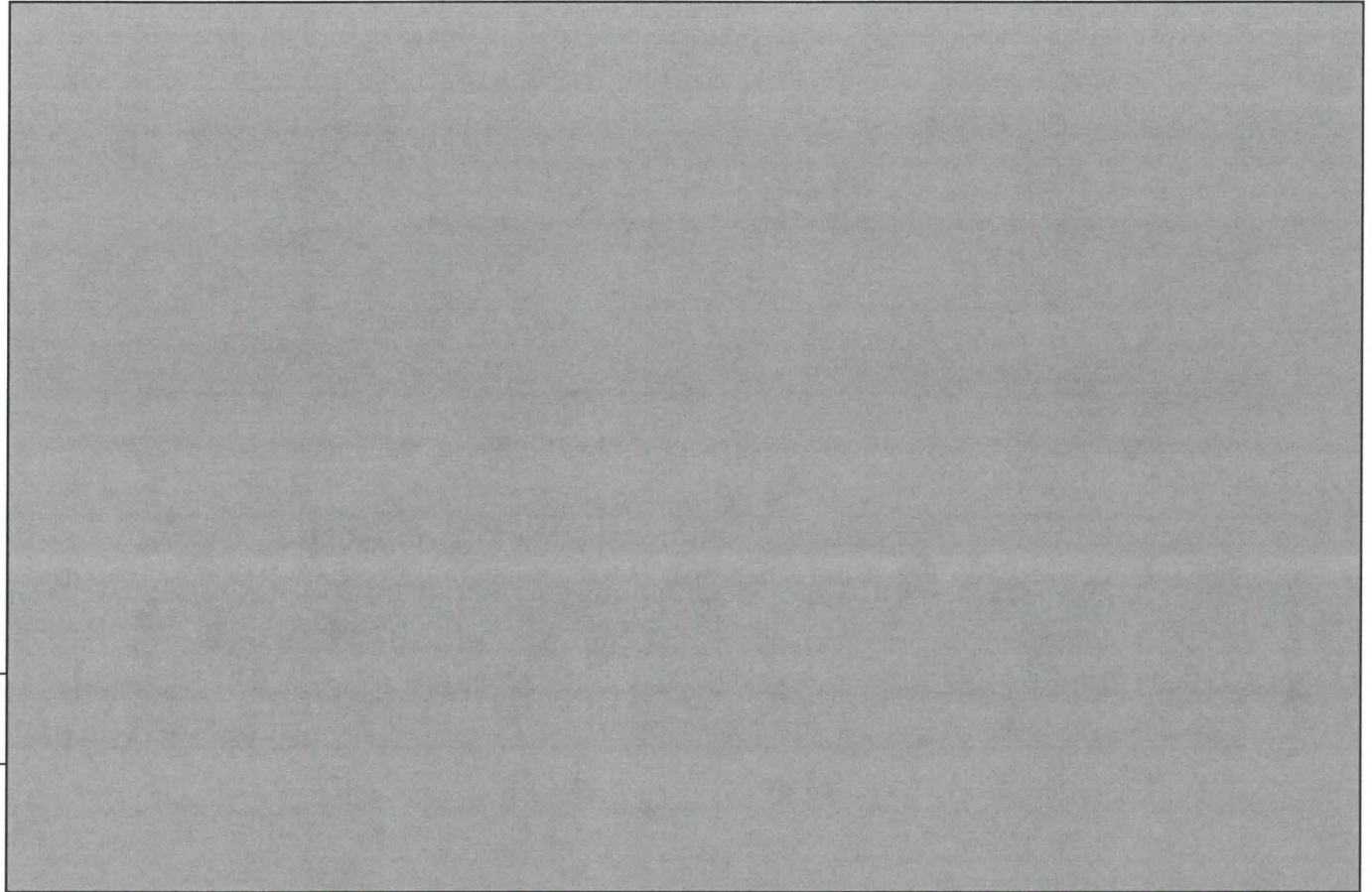


Figure 2 – Power on Primary/Secondary State Determination

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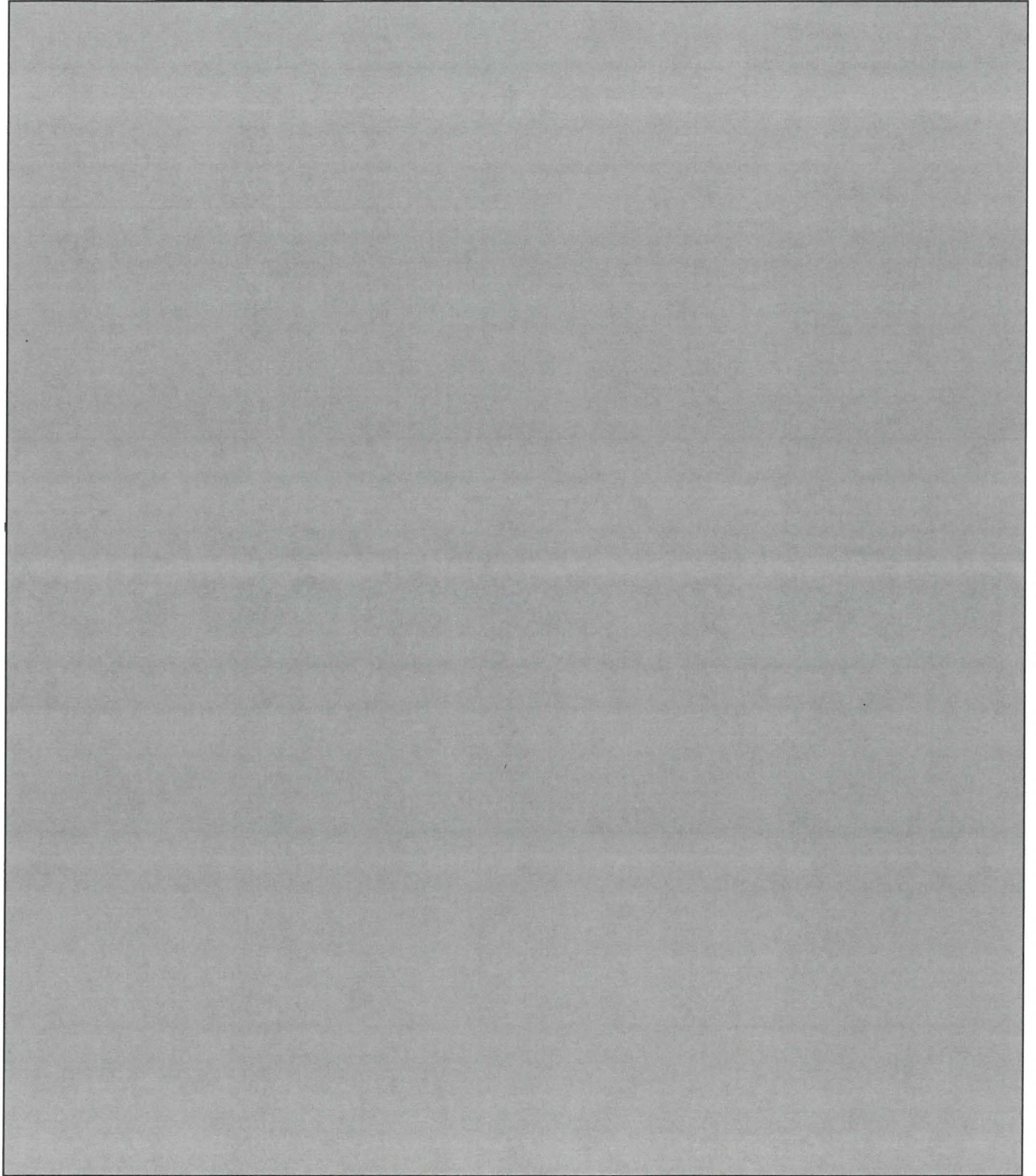


Figure 3 – Runtime Primary/Secondary State Determination

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3.6.1.7 Synchronization

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Figure 4 – Transition to Next State

3.6.1.8 eLpcTask Task

[]

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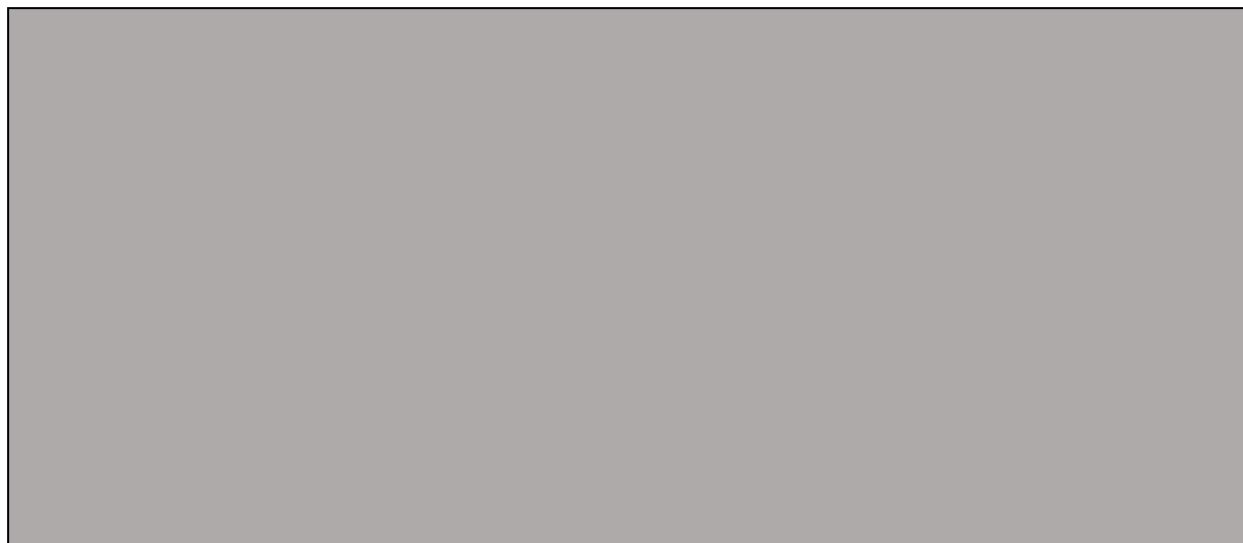


Figure 5 – eLPC Data Flow (A Controller Primary)

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Table 2 – eLPC Go Word Codes

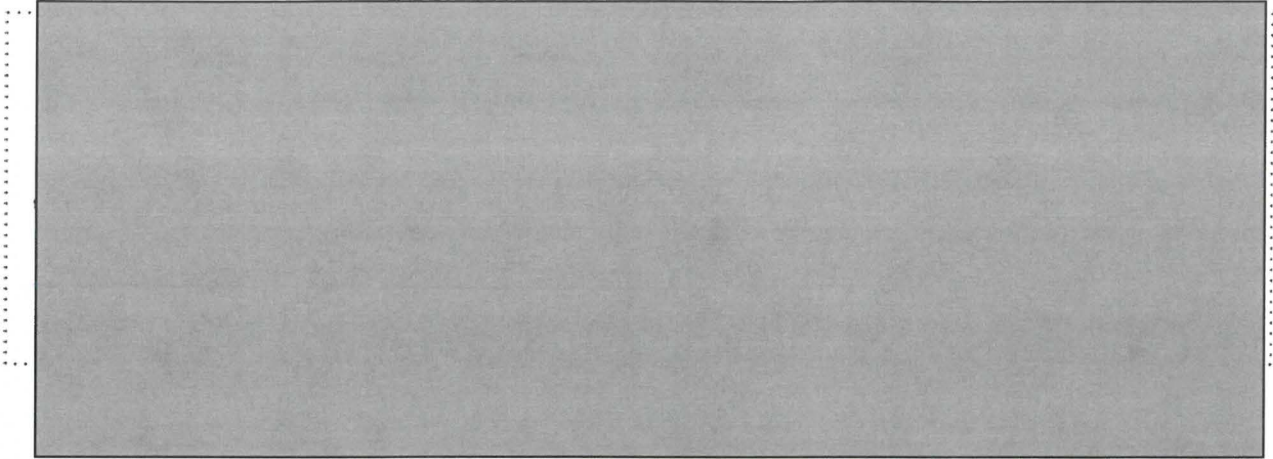


Figure 6 – Go Word mechanism

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3.6.1.9 FPC08 Task

[

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3.6.1.10 glinkTask Task

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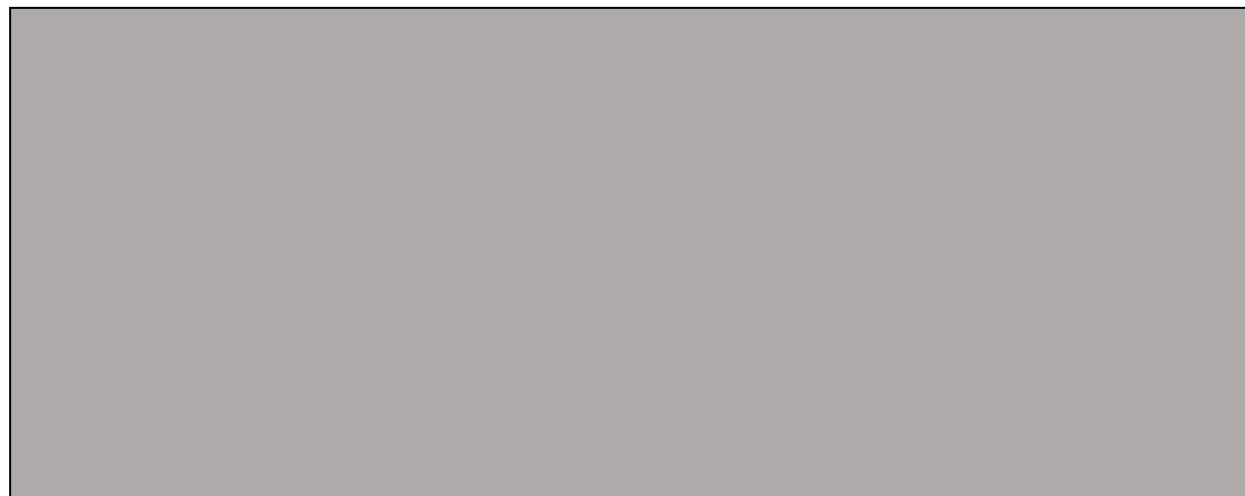




Table 3 - G-Link Memory Map

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A large rectangular box with a light gray fill and a black border, representing the content of Table 4.

Table 4 - G-Link DDB Data Format

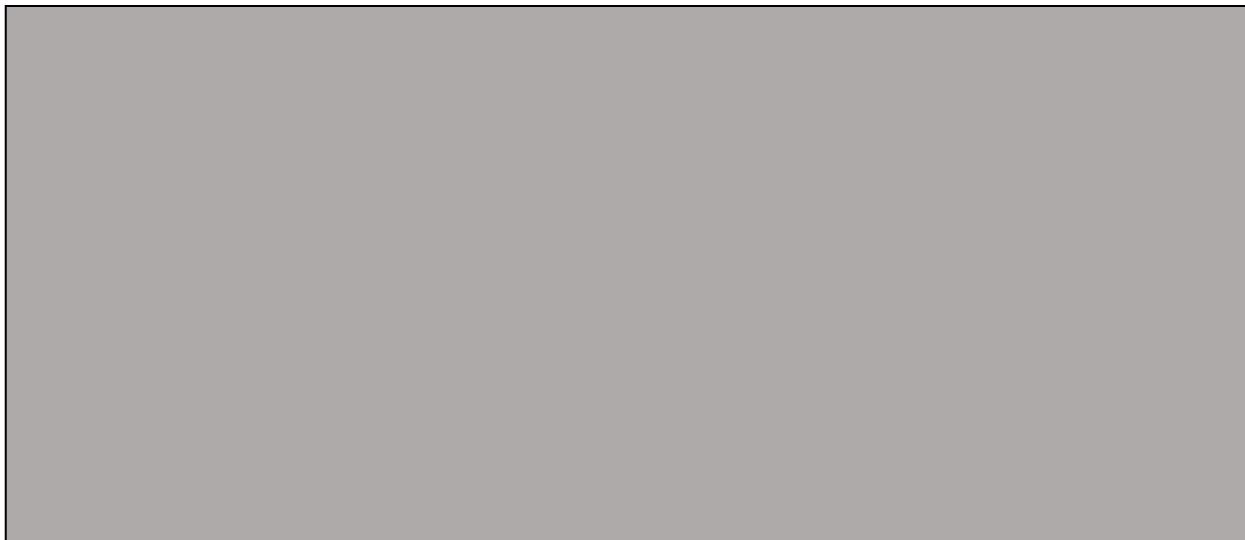
A large rectangular box with a light gray fill and a black border, representing the content of Table 5.

Table 5 - G-Link Packet Types

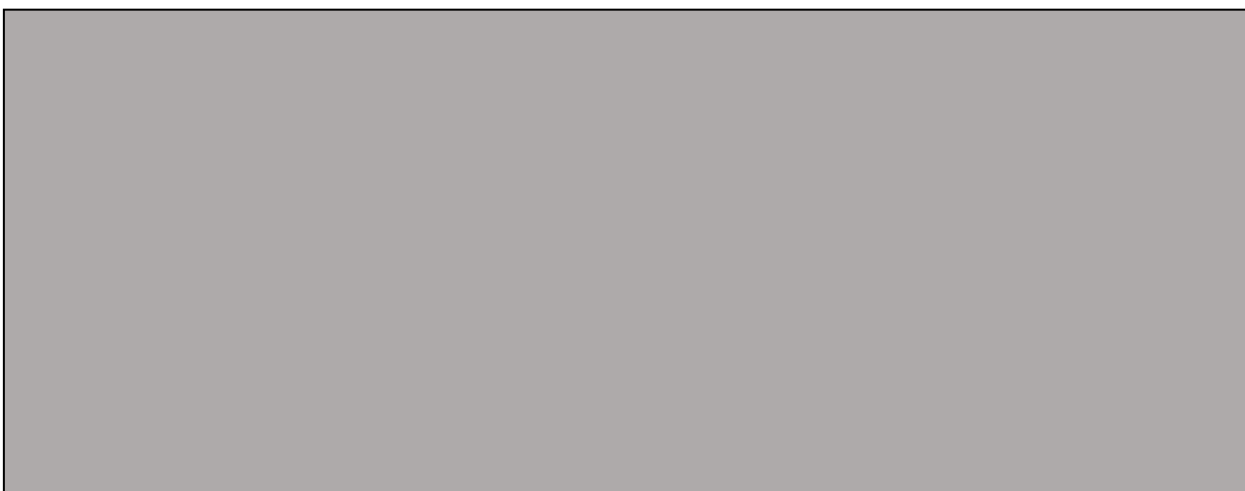
A large rectangular box with a light gray fill and a black border, representing the content of Table 6.

Table 6 - G-Link Point Types

3.6.1.11 cpcTask Task

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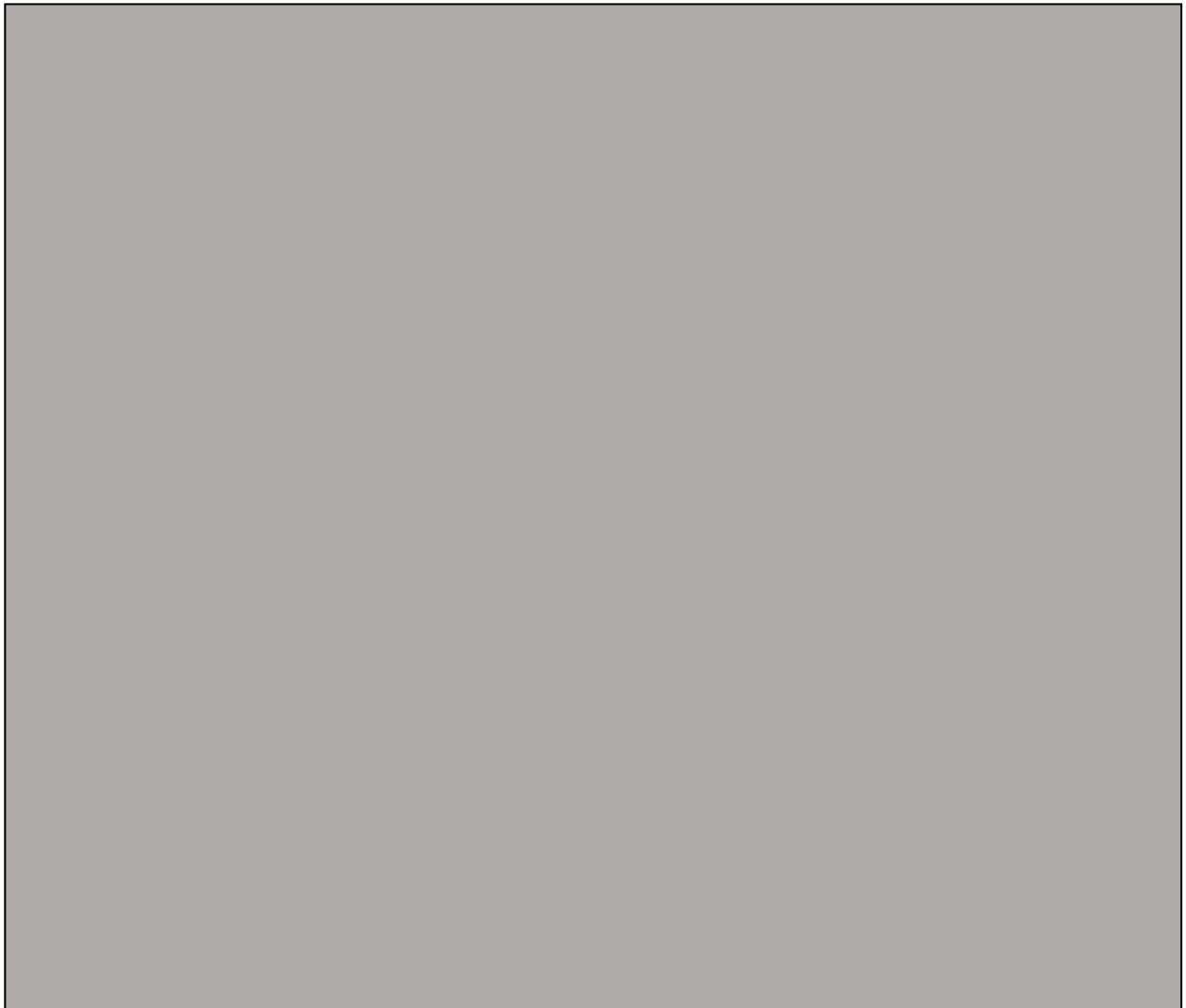
[

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3.6.1.12 idleTask Task

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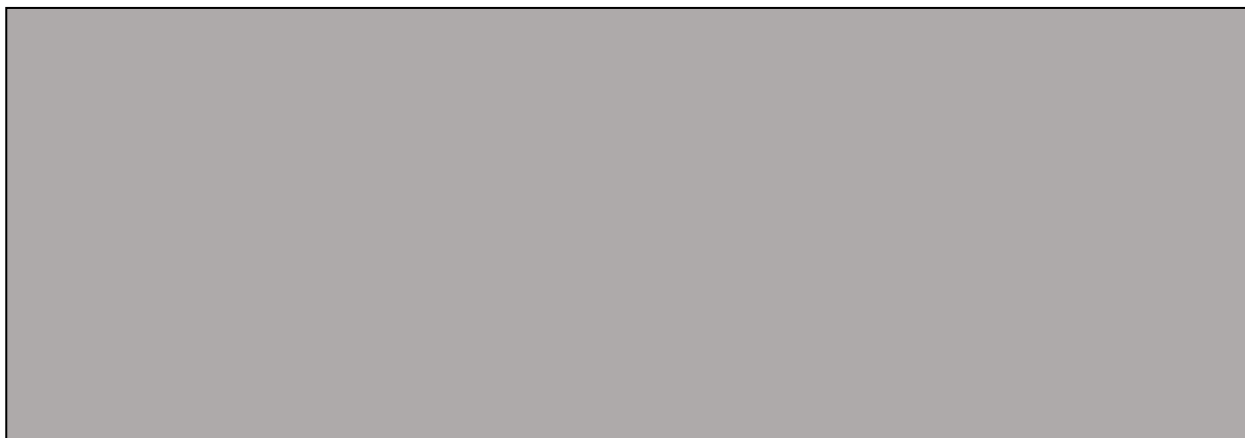


Table 7- System Resources

[

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3.6.1.13 cpcTask Task (hifr.h, cpcTask_def.h, rqImage.h)

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3.6.1.14 System Information (global_def.h)

[

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[

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[

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[

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3.6.1.15 FPC08 Task Global Parameters (FPC08.h)

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[

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3.6.1.16 glinkTask Task (glinkTask.h, glinkTask_def.h, card_def.h)

[

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[

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[

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The following structure describes the data format of a G-Link record.

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3.6.1.17 Database Access (ctrl_types.h)

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[

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[

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3.6.1.18 idleTask Task (idleTask.h, idleTask_def.h)

[

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[

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3.6.1.19 eLpcTask Task (eLpcTask.h)

[

]

3.6.1.20 Library Support (ioUtils.h, timing.h, parse.h, lpc.h)

[

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[

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3.6.1.21 Configuration Files

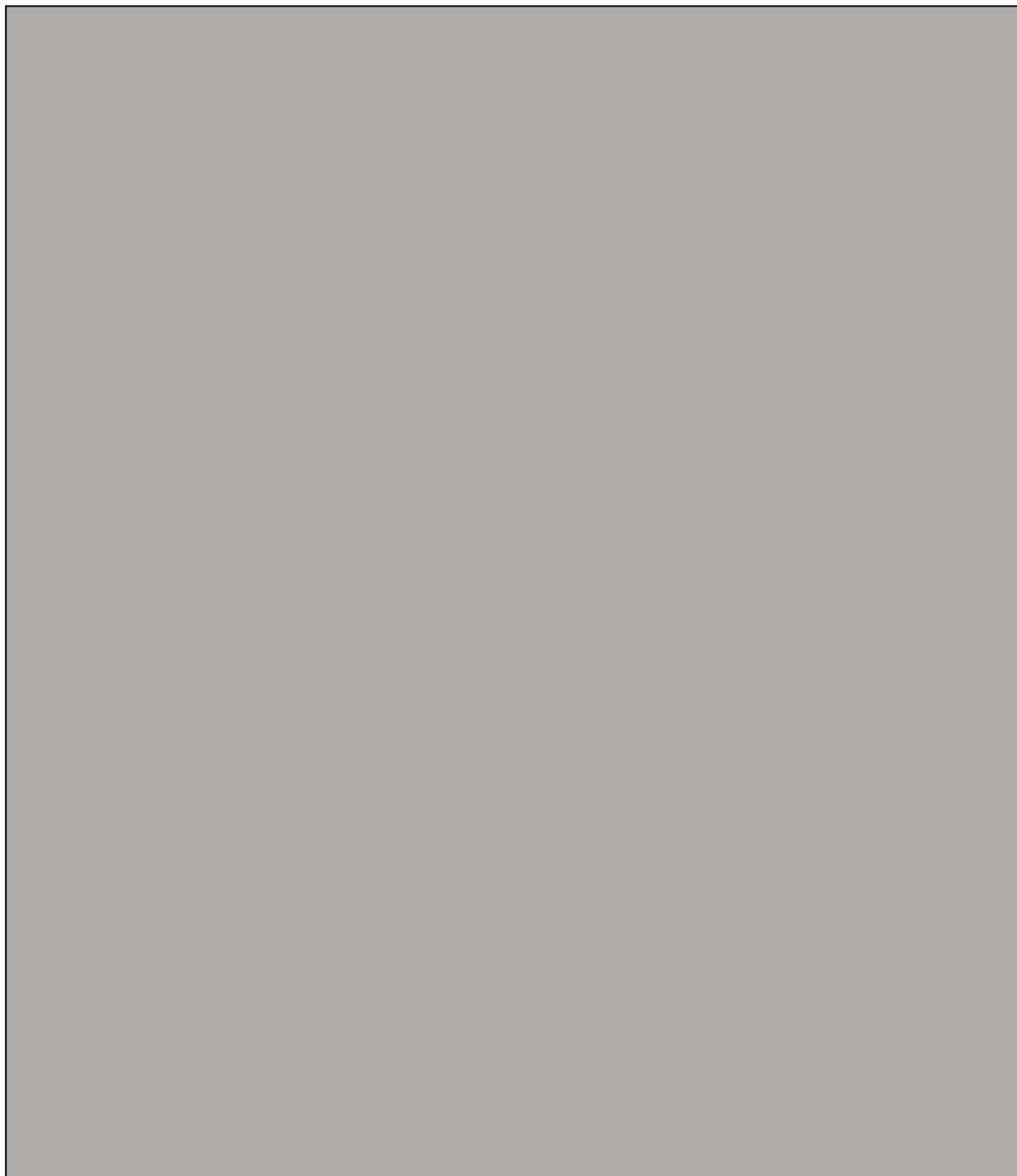
[

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3.6.1.21.1 Database Configuration File (rmCfg.sxx)

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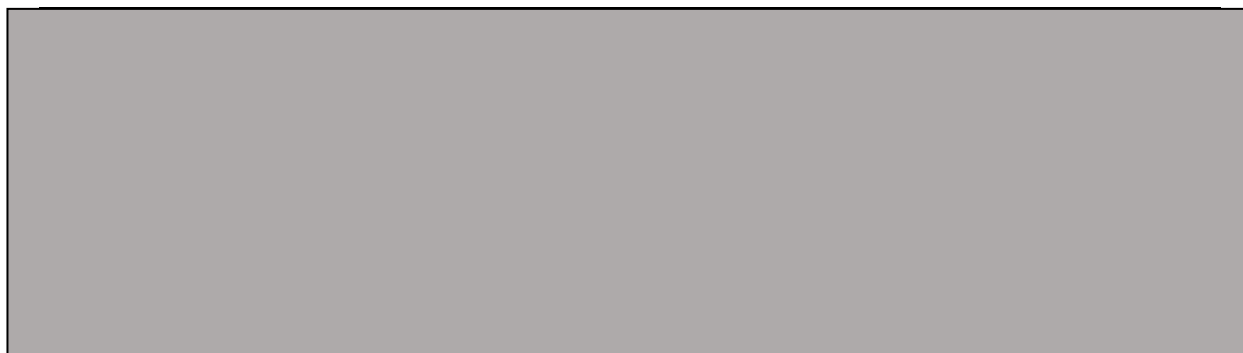


Table 8 – rmCfg.sxx File Format

3.6.1.21.2 Dynamic Data Broadcast (DDB) Configuration File (rqdat63.sxx)

[

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Table 9 - DDB Statement Syntax

[

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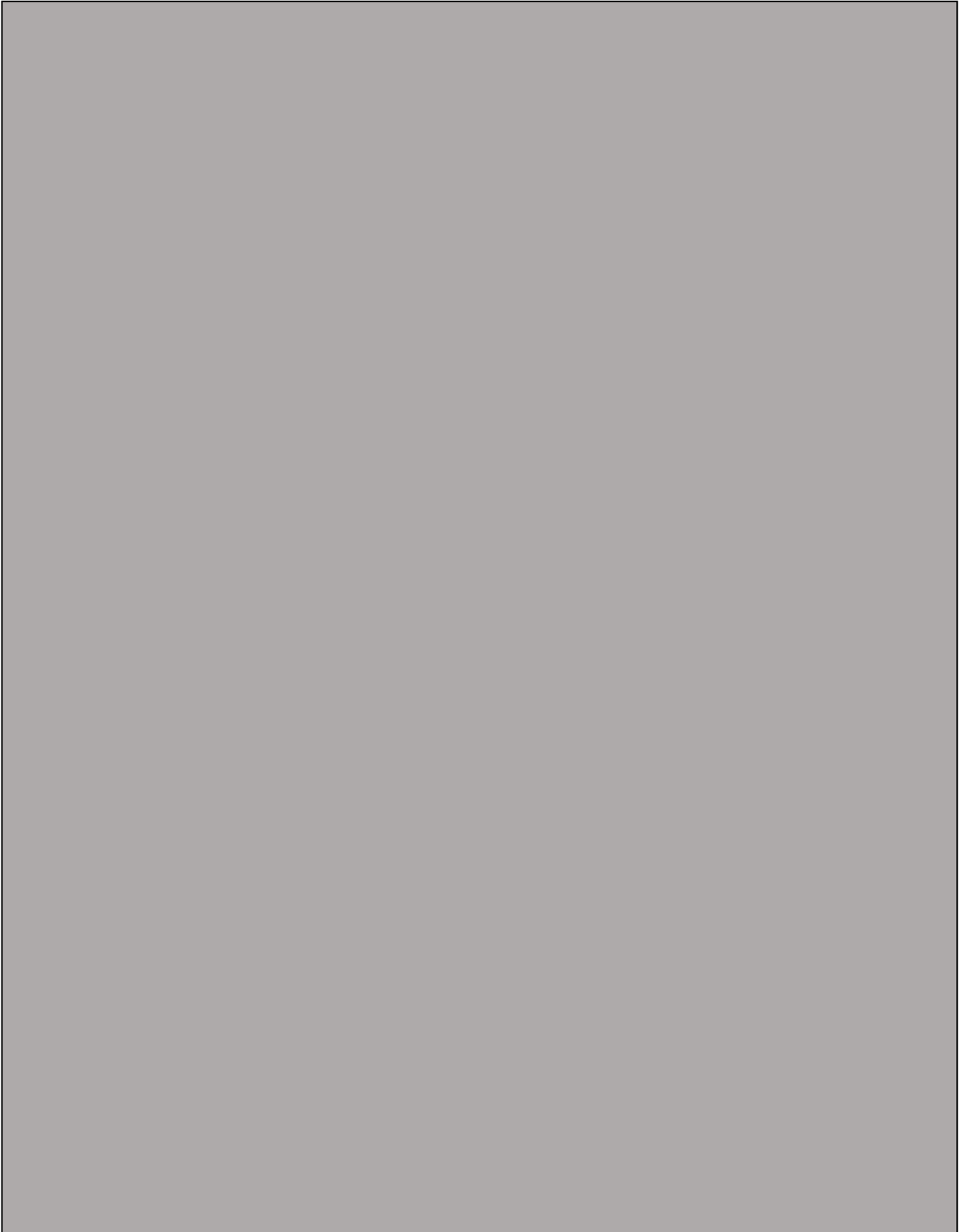




Table 10 – FILTER Statement Syntax

[

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3.6.1.21.3 G-Link Configuration File (glinkData.xx)

[

]



Table 11 - DDB Statement Syntax

3.6.2 Data Flow

[

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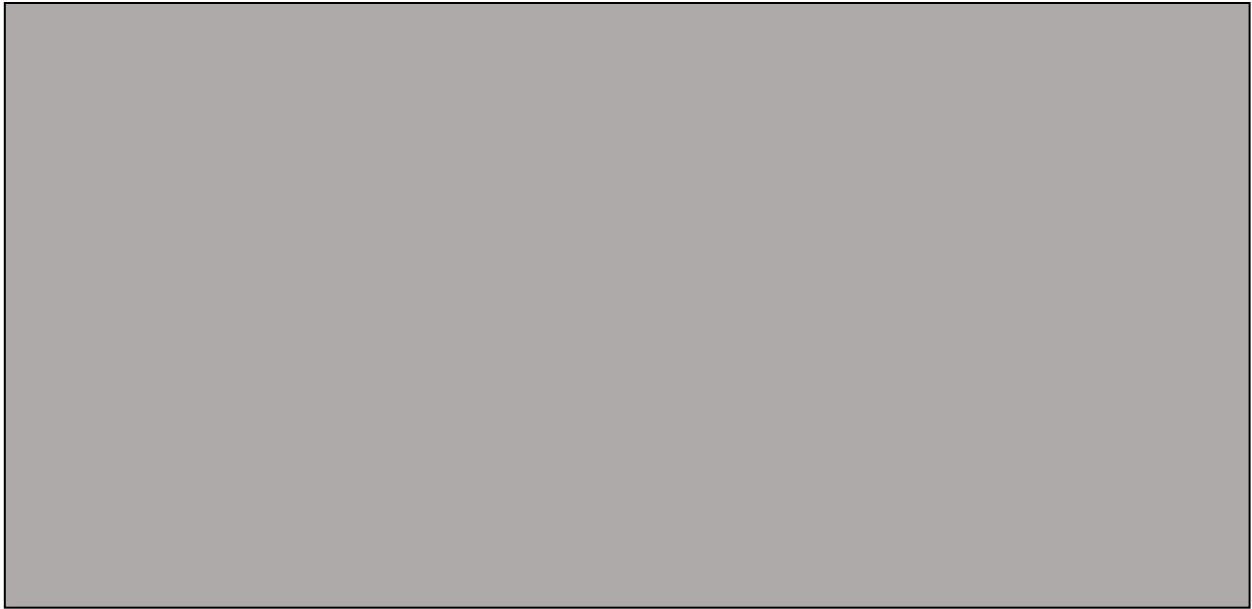


Figure 7 – System Data Flow

3.6.3 Process Control Concept

3.6.3.1 ELPC Task Operation

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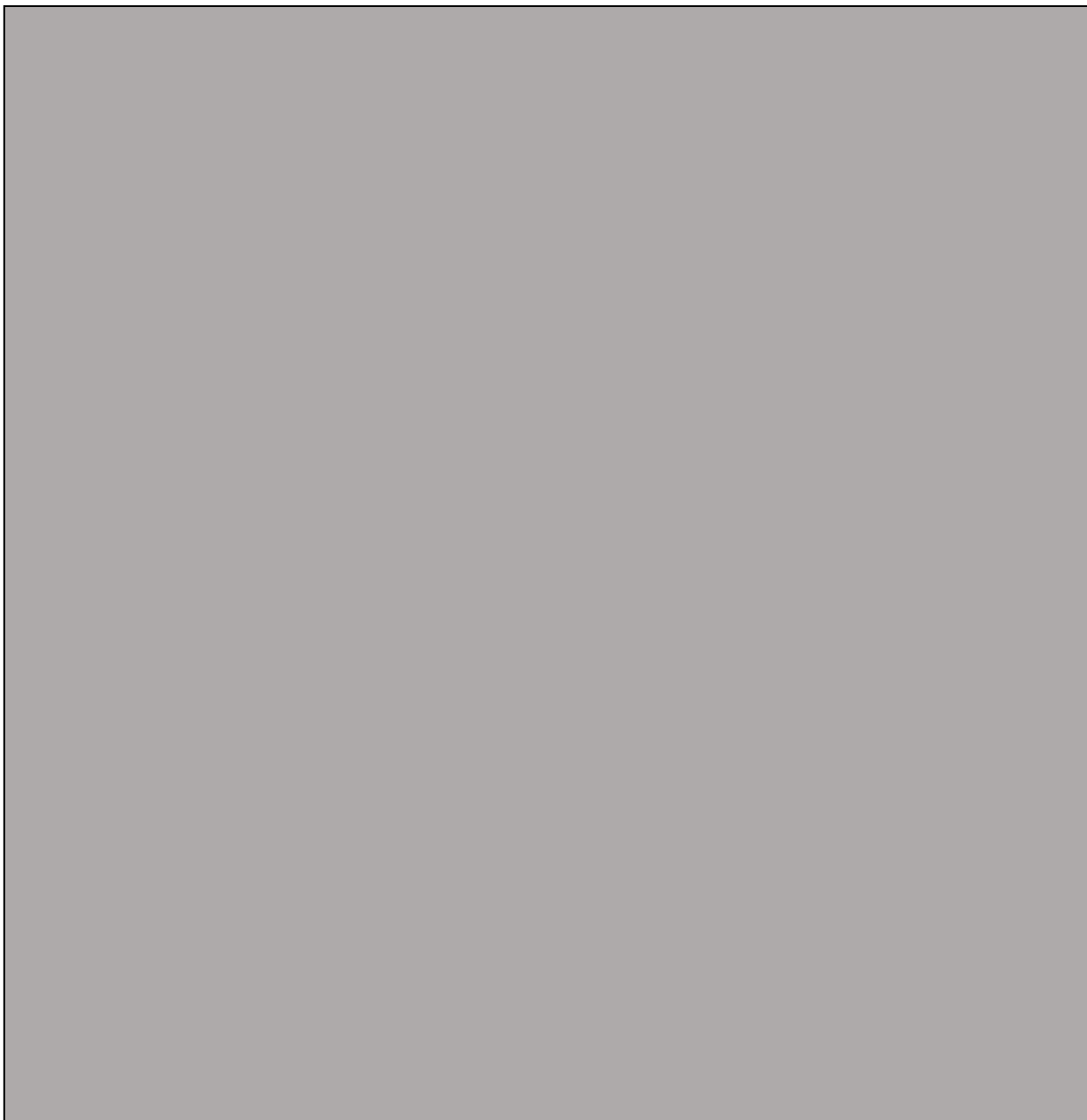


Figure 8 – ELPC Task Flow Chart

3.6.3.2 Equalization in IdleTask

[

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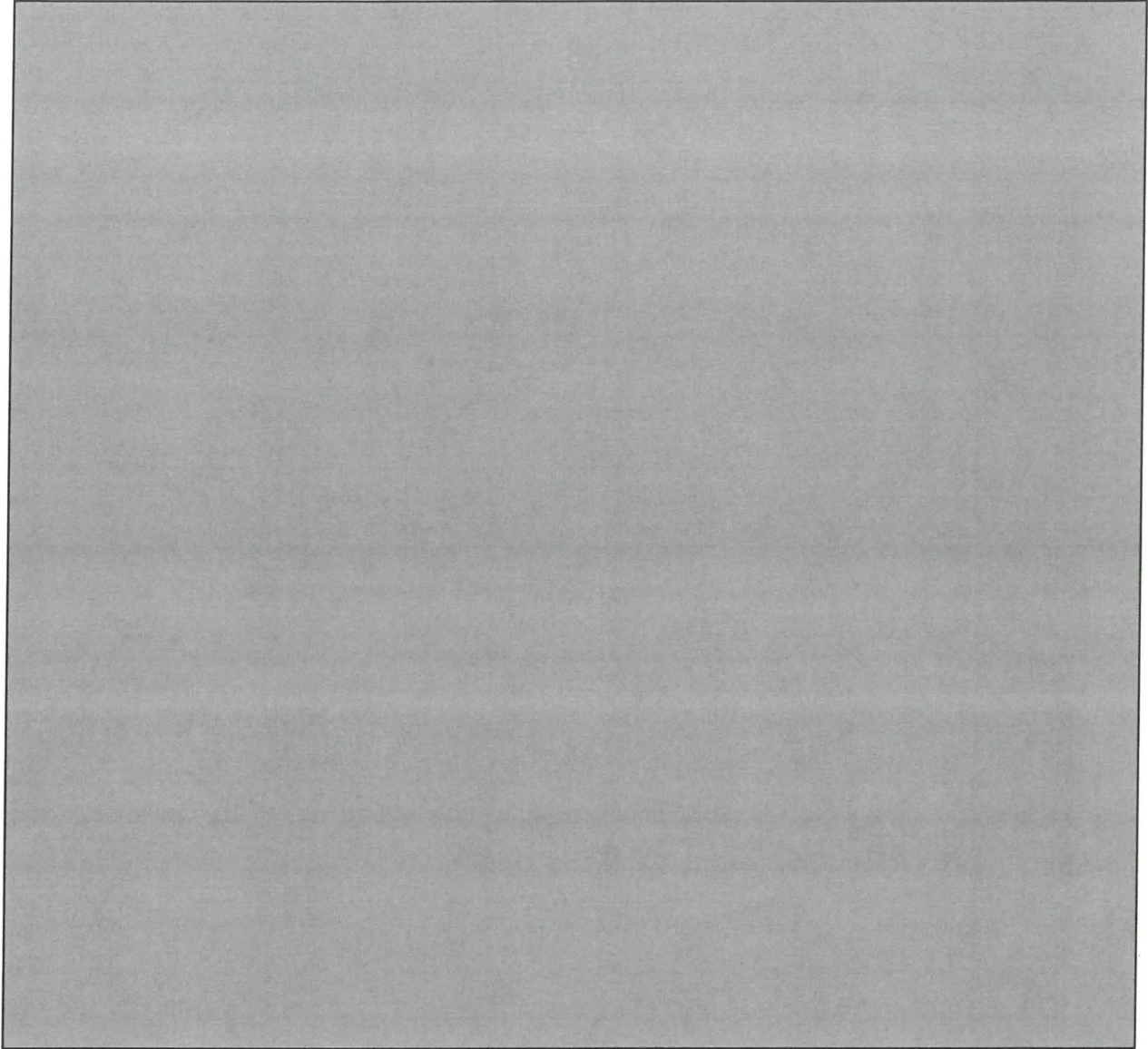


Figure 9 – Equalization in IdleTask

[

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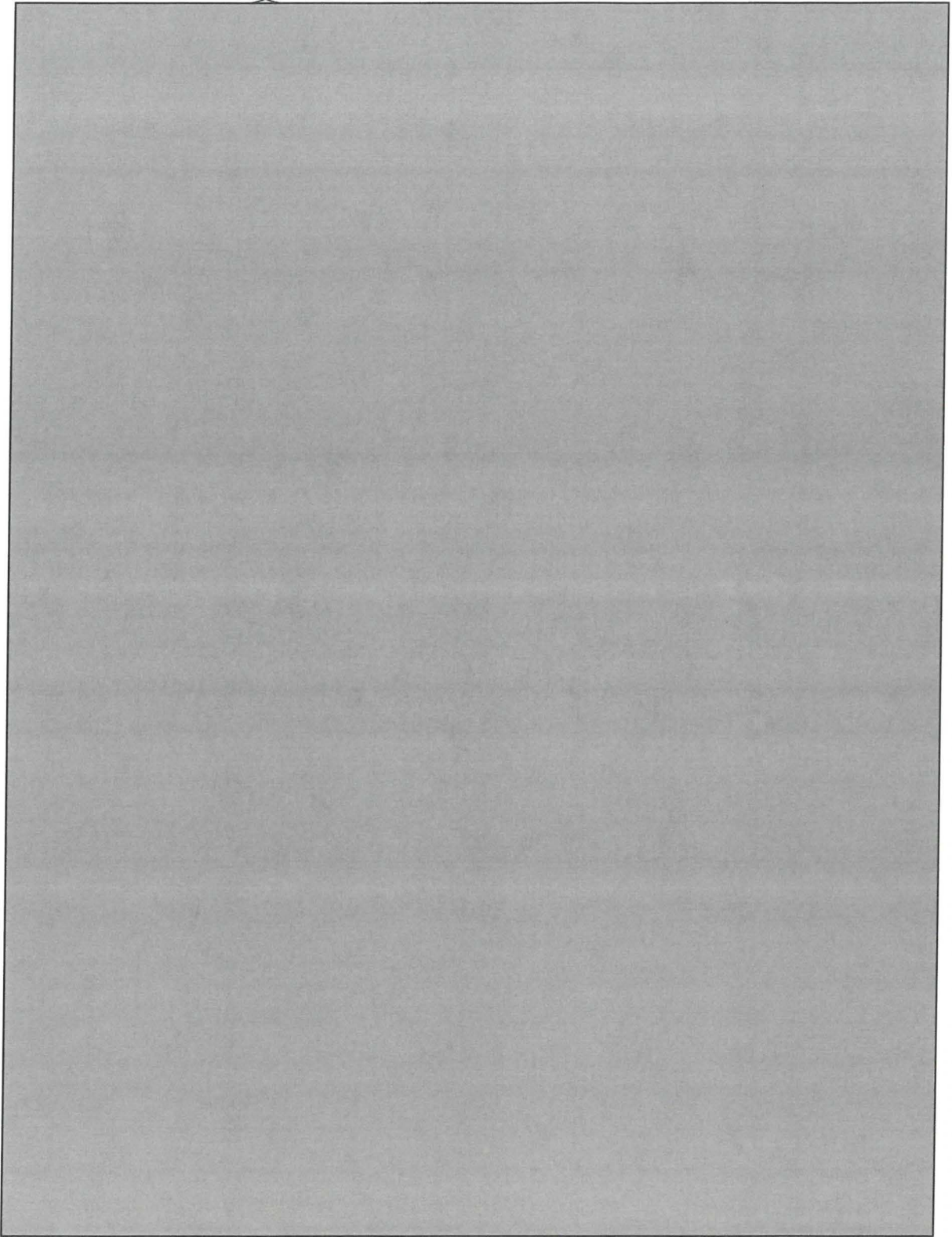


Figure 10 – doDrops

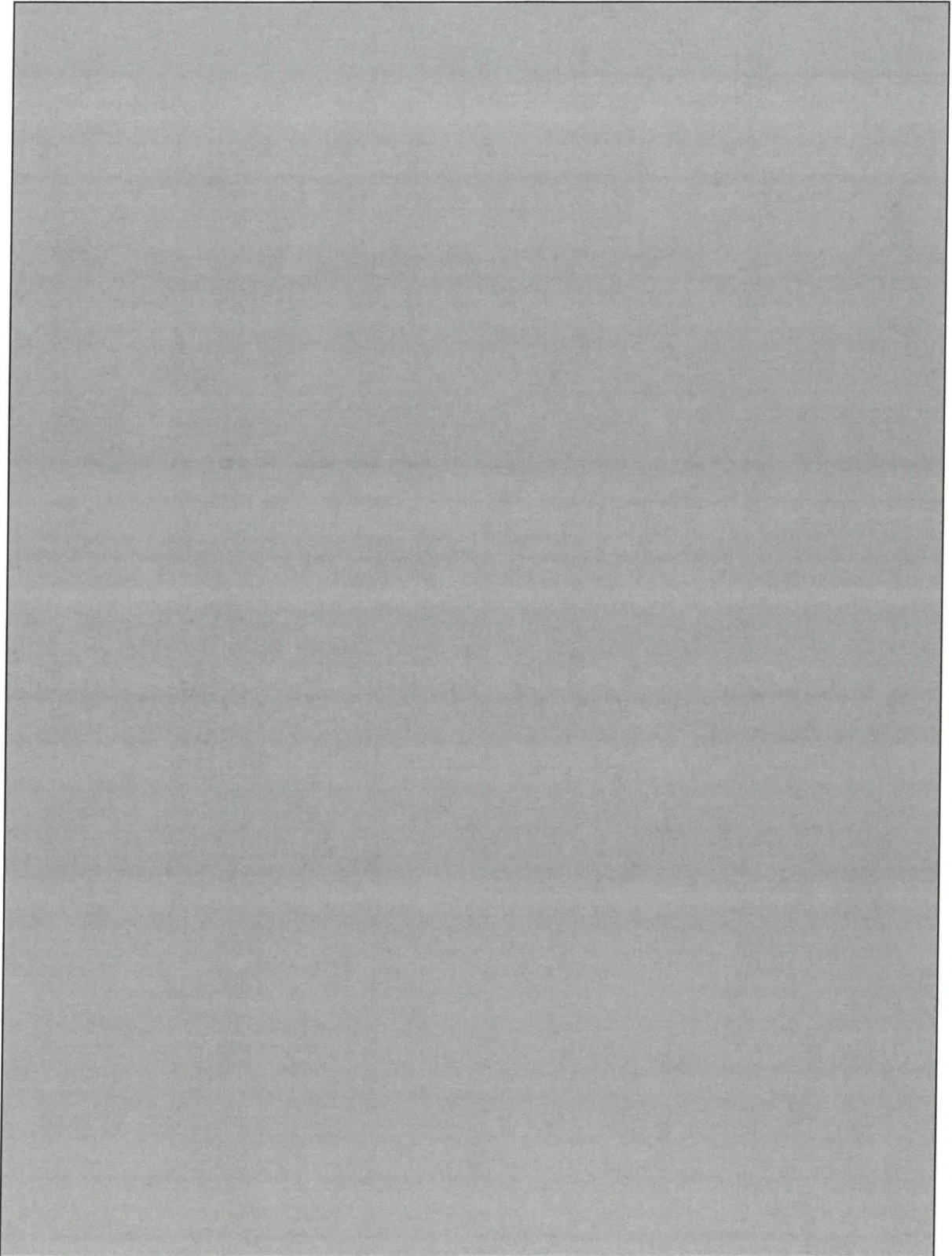


Figure 11 – chkDrops

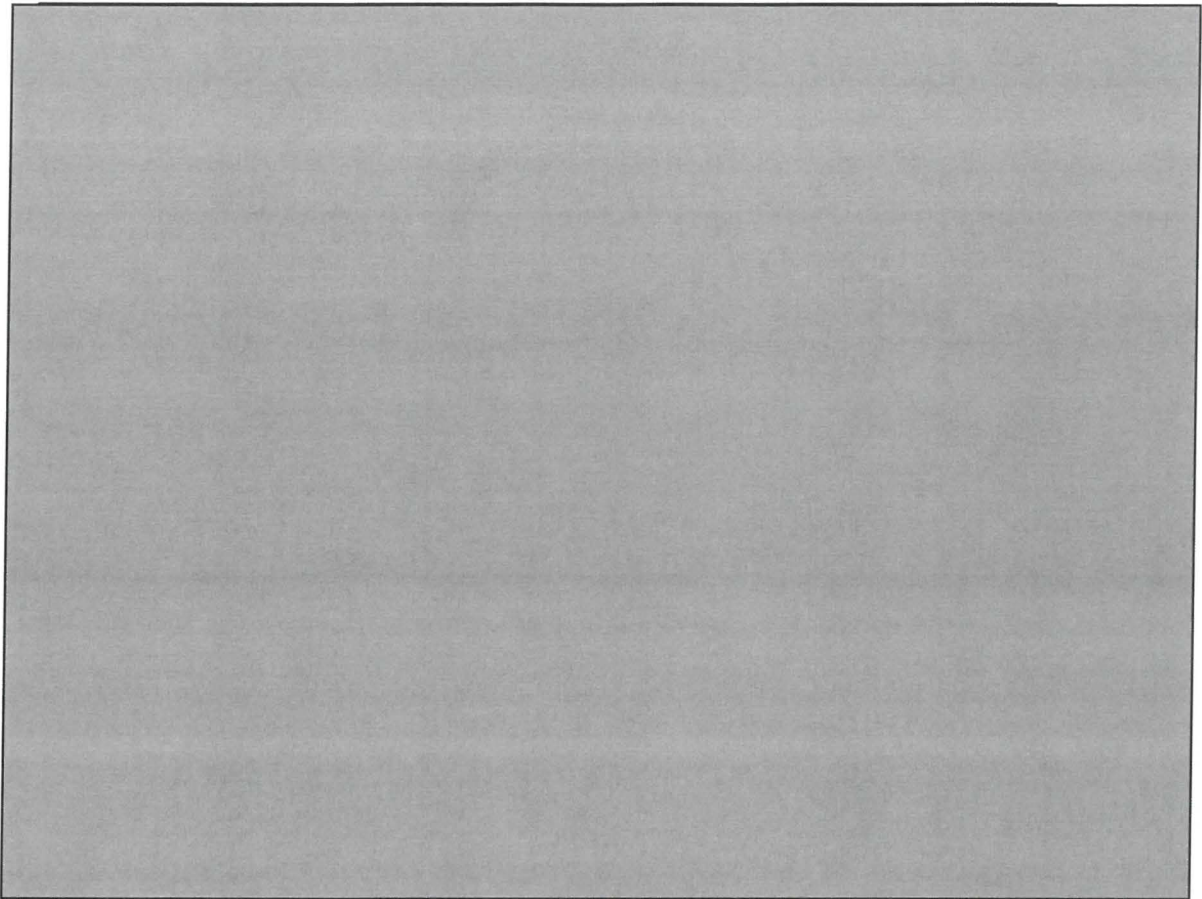


Figure 12 – isEqualized

3.6.3.3 Failover Scenario

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[

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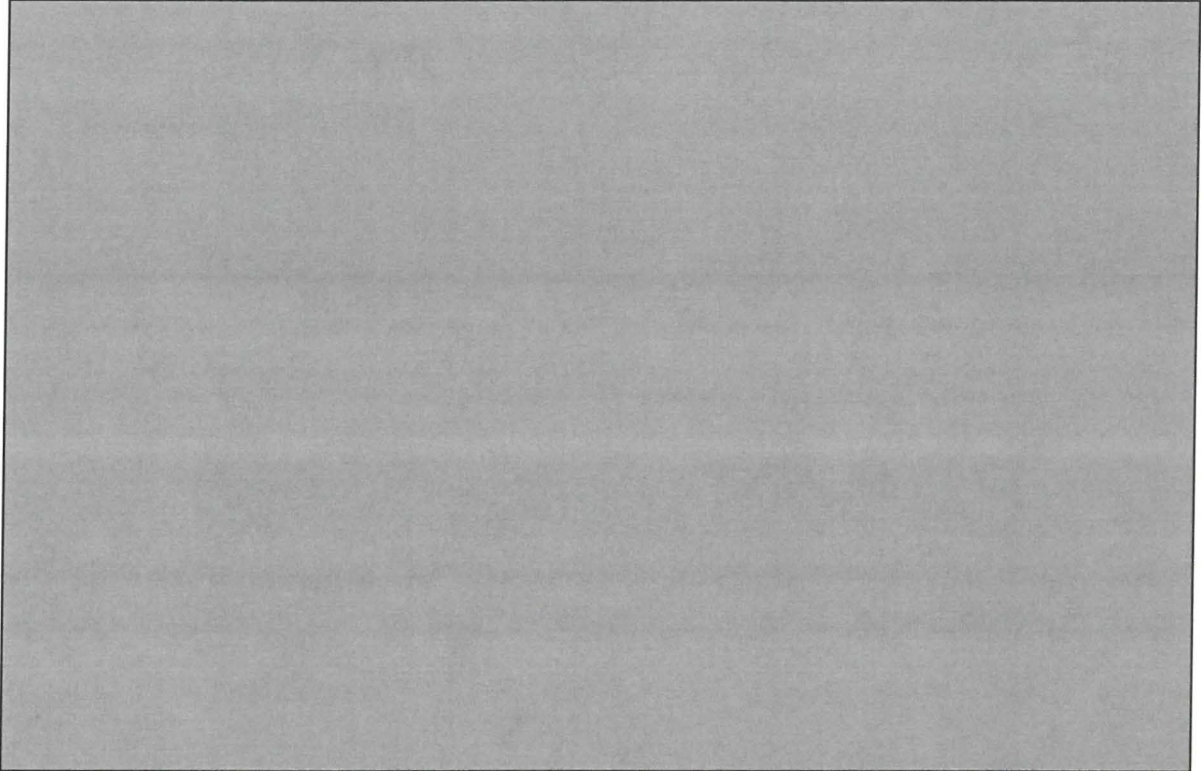


Figure 13 – Ethernet check

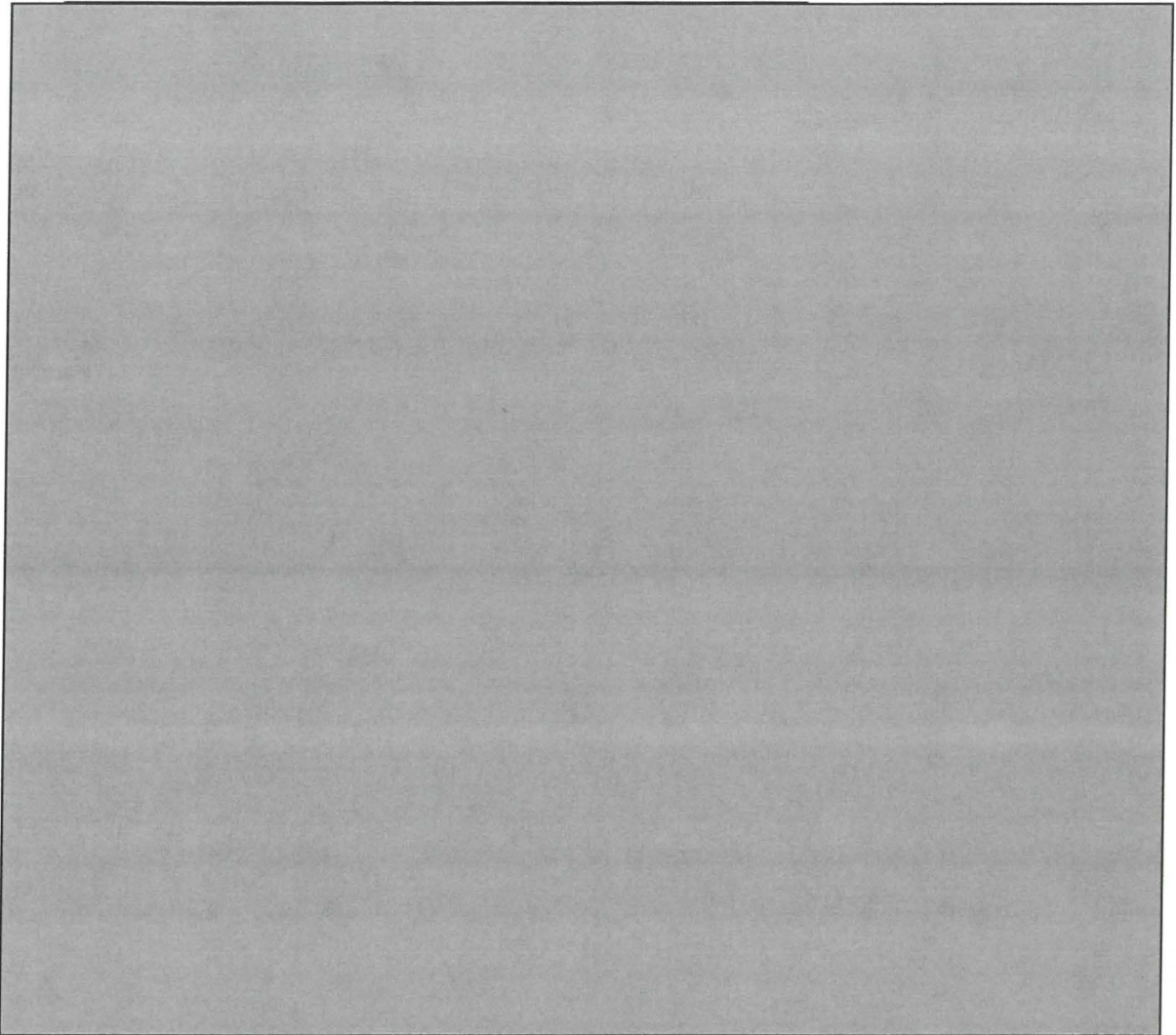


Figure 14 - forceFailover

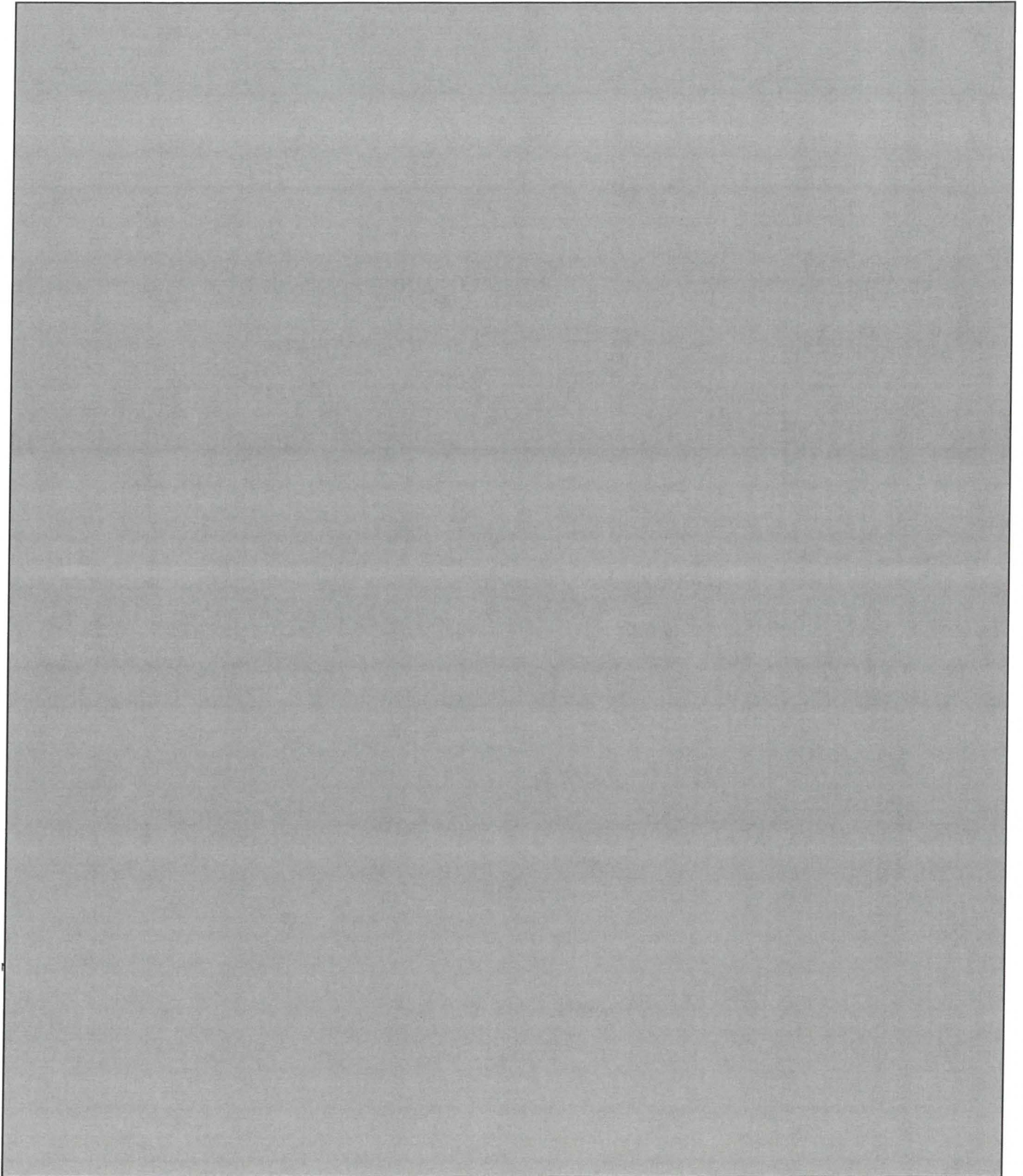


Figure 15 – Glink Check

3.6.3.4 Task Execution Sequence

[

]



Figure 16 – Other Tasks Flow Chart

4.0 SOFTWARE MODULES

[

]

4.1 COMMON PROGRAM FILES

[

]

4.1.1 crc16.c

4.1.1.1 Algorithm/Process Control

[

]

4.1.1.2 Activation

[

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4.1.1.3 Entry and Exit

[

]

4.1.2 fileUtils.c

4.1.2.1 Algorithm/Process Control

[

]

[

]

4.1.2.2 Activation

[

]

4.1.2.3 Entry and Exit

[

]

[]

4.1.3 ioUtils.c

4.1.3.1 Algorithm/Process Control

[

]

4.1.3.2 Activation

[

]

4.1.3.3 Entry and Exit

[

]

[

]

4.1.4 LED.c

4.1.4.1 Algorithm/Process Control

[

]

4.1.4.2 Activation

[

]

4.1.4.3 Entry and Exit

[

]

4.1.5 log.c

4.1.5.1 Algorithm/Process Control

[

]

[

]

4.1.5.2 Activation

[

]

4.1.5.3 Entry and Exit

[

]

[

]

4.1.6 lpc.c

4.1.6.1 Algorithm/Process Control

[

]

[

]

4.1.6.2 Activation

Any of the functions in this module can be called at any time.

4.1.6.3 Entry and Exit

[

]

[

]

[

]

4.1.7 misc.c

4.1.7.1 Algorithm/Process Control

[

]

4.1.7.2 Activation

[

]

4.1.7.3 Entry and Exit

[

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[

]

4.1.8 sanity.c

4.1.8.1 Algorithm/Process Control

[

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[

]

[

]

4.1.8.2 Activation

[

]

4.1.8.3 Entry and Exit

[

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[

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4.1.9 timing.c

4.1.9.1 Algorithm/Process Control

[

]

4.1.9.2 Activation

[]

4.1.9.3 Entry and Exit

[

]

4.2 FPC08 TASK PROGRAM FILES

[

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[]

4.2.1 appUpdate.c

4.2.1.1 Algorithm/Process Control

[]
].

4.2.1.2 Activation

[]

4.2.1.3 Entry and Exit

[]
]

4.2.2 FPC08.c

4.2.2.1 Algorithm/Process Control

[]

[

]

4.2.2.2 Activation

[

]

4.2.2.3 Entry and Exit

[

]

[

]

4.2.3 FPC08 init.c

4.2.3.1 Algorithm/Process Control

[

]

4.2.3.2 Activation

[

]

4.2.3.3 Entry and Exit

[

]

4.2.4 FPC08 misc.c

4.2.4.1 Algorithm/Process Control

[

]

4.2.4.2 Activation

[

]

4.2.4.3 Entry and Exit

[

]

void finish(void)

[

]

4.2.5 ioImage.c

4.2.5.1 Algorithm/Process Control

[

]

4.2.5.2 Activation

[

]

4.2.5.3 Entry and Exit

[

]

[]

4.2.6 rqImage.c

4.2.6.1 Algorithm/Process Control

[]

4.2.6.2 Activation

[]

4.2.6.3 Entry and Exit

[]

4.3 GLINK TASK PROGRAM FILES

[]

4.3.1 card.c

4.3.1.1 Algorithm/Process Control

[

]

4.3.1.2 Activation

[

]

4.3.1.3 Entry and Exit

[

]

4.3.2 glinkTask.c

4.3.2.1 Algorithm/Process Control

[

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[

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4.3.2.2 Activation

[

]

4.3.2.3 Entry and Exit

[

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[

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4.3.3 io_init.c

4.3.3.1 Algorithm/Process Control

[

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4.3.3.2 Activation

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4.3.3.3 Entry and Exit

[

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4.3.4 io Access.c

4.3.4.1 Algorithm/Process Control

[

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4.3.4.2 Activation

[

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4.3.4.3 Entry and Exit

[.

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[

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4.4 CPCTASK TASK PROGRAM FILES

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4.4.1 cpcTask.c

4.4.1.1 Algorithm/Process Control

[

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[

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4.4.1.2 Activation

[

]

[]

4.4.1.3 Entry and Exit

[]

[

]

4.4.2 ioAccess.c

4.4.2.1 Algorithm/Process Control

[

]

4.4.2.2 Activation

[

]

4.4.2.3 Entry and Exit

[

]

[

]

4.4.3 UCPProc.c

4.4.3.1 Algorithm/Process Control

[

]

4.4.3.2 Activation

[]

4.4.3.3 Entry and Exit

[

]

4.5 IDLETASK TASK PROGRAM FILES

4.5.1 idletask.c

4.5.1.1 Algorithm/Process Control

[

]

4.5.1.2 Activation

4.5.1.3 Entry and Exit

4.5.2 equalize.c

4.5.2.1 Algorithm/Process Control

4.5.2.2 Activation

4.5.2.3 Entry and Exit

[]

[

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