

Multi-Purpose Workstation Configuration and Support

Kai Wang

Prepared by:

MacDonald, Dettwiler and Associates Ltd.
13800 Commerce Parkway, Richmond, B.C., Canada, V6V 2J3

Prepared for:

Project Manager: Edwin Riseborough 613-998-2052
Contract Number: W7714-115147/001/SV
Technical Authority: David Kirkland
DRDC – Ottawa Research Centre, 613-949-0552

The scientific or technical validity of this Contract Report is entirely the responsibility of the Contractor and the contents do not necessarily have the approval or endorsement of the Department of National Defence of Canada.

Contract Report
DRDC-RDDC-2016-C313
July 2016

© Her Majesty the Queen in Right of Canada, as represented by the Minister of National Defence, 2016

© Sa Majesté la Reine (en droit du Canada), telle que représentée par le ministre de la Défense nationale, 2016

Approved by

Dr. David Kirkland

Approved for release by

© Her Majesty the Queen in Right of Canada as represented by the Minister of National Defence, 2016

© Sa Majesté la Reine (en droit du Canada), telle que représentée par le ministre de la Défense nationale, 2016

Abstract

This report documented the MPW Configuration under Taks #8 of MPW Configuration and Support.

The MPW hardware has been set up including the Windows Workstation and the Linux Server. The MPW Software has been installed on both Windows Workstation and Linux Server. The MPW software requirements and configurations has been documented in details. Minor software issues has been identified and documented with temporary fix.

This page intentionally left blank.

Executive summary

Contract Report: SAR MTI Detection and Tracking

Kai Wang; ; Defence R&D Canada – Ottawa; July 2016.

Defence Research and Development Canada - Ottawa has developed several radar signal processors for both raw and preprocessed datasets. The Multi-Purpose Workstation(MPW) is used to provide a graphical user interface and task management for the available radar signal processors. This document summarizes the work done during Task #8 of MPW Configuration and Support.

The MPW hardware consists of a Windows Workstation and a Linux Server. The signal processors available within MPW software will be running in either Windows Workstation or Linux Server depending on the program type. The details of the MPW software configurations installed on both Windows Server and Linux Server has been documented. The software configurations is consist of but not limited to: processor's location path, network drive mapping between windows and linux, file system's format, computer specific parameter file and computer memory management.

This page intentionally left blank.

Table of contents

Abstract	i
Executive summary	iii
Table of contents	v
List of figures	vii
List of tables	viii
1 Hardware Setup	1
2 Software Installation	2
3 Software Requirements	3
3.1 Linux Server	3
3.2 Windows Workstation	4
4 Software Settings	5
4.1 Linux Server	5
4.1.1 Shared Memory Settings	5
4.1.2 MPW Settings File	5
4.1.3 Samba Configuration	6
4.1.4 RTBP Configuration Files	7
4.1.5 Start RTBP Listener	7
4.2 Windows Workstation	8
4.2.1 MPW Settings File	8
4.2.2 Program Description File	8
4.2.3 Network Drive Mapping	8
4.2.4 Matlab Adjustments	8

5	RTBP Processor Notes	9
5.1	Samba	9
5.2	Raw Data Location	9
	References	11

List of figures

List of tables

Table 1:	MPW Hardware	1
Table 2:	MPW Sotware	2

1 Hardware Setup

The Windows Workstation and the Linux Server has the hardware configuration as shown in Table 1. To run Linux programs, the Windows Workstation must be connected to the Linux Server over a LAN.

Table 1: *MPW Hardware*

	Windows Workstation	Linux Server
CPU	i5-3570 @ 3.40GHz	Xeon E5-2660 @ 2.20GHz
Memory	8GB	32GB
OS	Windows 7	Ubuntu 14 and Windows 7
Graphic	integrated	2 X Quadro K5000

2 Software Installation

The MPW software package is contained within a single zip file "MPW_Sw_Release_2.0_130331.zip". After unzipping, we have the extracted files as shown in Table 2.

The majority of the files is kept on the Windows Workstation. The files in the folder "linux" has been copied onto the Linux Server to run Linux program.

Table 2: MPW Software

File/Folder Name	Descriptions
coreMatlab	Matlab functions common to many of the tools
linux	Files to be copied to the Linux server
matlabProcessors	Matlab processors included in the MPW software
MpwTaskManager.lib	Java library files used by the Task Manager
MpwViewer.lib	Java library files used by the Data Viewer
programDescriptionFiles	XML program description files
regDatabase	The registration database
MPW_Settings	configuration parameters for MPW
MpwTaskManager.jar	The Task Manager runnable Java archive
MpwViever.jar	The Data Viewer runnable Java archive

3 Software Requirements

There is some key software requirements for MPW to run successfully and be able to communicate successfully between Windows Workstation and Linux Server.

3.1 Linux Server

MPW Software Packages

All the files in the folder "linux" and the file "MPW.Settings" as shown in Table 2 must be copied to the Linux Server for MPW to run Linux programs. The file "MPW.Settings" must be updated accordingly before copying from Windows Workstation to Linux Server.

Java Runtime Environment (JRE) Version 7

The Linux daemon program is required to be up with Java. It will run in the background and wait for the processing requests from MPW.

Samba

Samba(or equivalent) is required to allow the Windows Workstation to map a network drive to a directory on the Linux server. After the Linux program finishing processing, we can access the processing results on Linux Server from Windows Workstation directly.

LAN

To run Linux program, the Windows Workstation computer must be connected to Linux Server over LAN.

3.2 Windows Workstation

MPW software packages

All the extracted files as shown in Table 2 must be copied to the Windows Workstation for MPW to run Windows programs. The files in the folder "linux" and the file "MPW.Settings" are irrelevant, and those files are for Linux Server to run Linux program.

Java Runtime Environment (JRE) Version 7

MPW is a Java based software. The MPW software are made of 3 Java executable JAR files.

Matlab R2010a

Some of the MPW processors was written in Matlab, and an active Matlab package is required to run Matlab programs. Currently both Matlab 2012 and 2013 are installed on the Windows Workstation. Please note here, when Windows programs starts running, MPW will look for Matlab 2013.

Internet Connection

The Windows Workstation must be connected to the internet for map content. This map content will form the basic map layer in Data Viewer within MPW.

LAN

To run Linux program, the Windows Workstation computer must be connected to Linux Server over LAN. This is not required if we only run windows programs.

4 Software Settings

The software settings for Windows Workstation is mainly about the processors' file locations. The software settings for Linux Server is mainly about the network drive mapping with appropriate user permission.

4.1 Linux Server

4.1.1 Shared Memory Settings

The default shared memory settings in Linux is not large enough to run Linux program. We can increase the size of the shared memory in Linux by editing the file `"/etc/sysctl.conf"`.

The current settings for the shared memory is:

```
kernel.shmall = 4194304
kernel.shmmax = 17179869184
kern.ipc.shmall = 4194304
kern.ipc.shmmax = 17179869184
```

4.1.2 MPW Settings File

The MPW setting file `"MPW_Settings"` contains the processors' location information and Linux Server's information. It is installation specific. The program path and the Linux computer info must be updated correspondingly.

The current settings is:

```
# MPW Settings File
# OCT 19 11:14:17 EST 2015

# Linux server settings
linuxServerPortNumber = 5005

# HP Z820
linuxMachineName = ott-w32672-lx.Ottawa.drddc.gc.ca

# viewer and task manager are on the same machine.
windowsMachineName = localhost
taskManagerServerPortNumber = 5501
viewerServerPortNumber = 5502
serverBacklog = 5

# root directory of the XML program description files
```



```

programFilePath = C:\\Users\\kai.wang\\Documents\\DRDC\\MPW\\programDescriptionFiles\\

# mapping between the windows and linux directory structures
# HP Z820 EXT4
linuxMountPoint_WindowsPath = X:\\
linuxMountPoint_LinuxPath = /home/kaiwang/Documents/

# User processing options
# attempt to show all output products in the Data Viewer
autoViewAllProducts = false

# attempt to automatically register all new products
autoRegisterAllProducts = false

# location of the registration database
regDatabaseDir = C:\\Users\\kai.wang\\Documents\\DRDC\\MPW\\regDatabase\\

# location of the core (common) Matlab MPW library
coreMatlabDir = C:\\Users\\kai.wang\\Documents\\DRDC\\MPW\\coreMatlab\\

```

4.1.3 Samba Configuration

Samba is used to create the network drive mapping directory on Linux Server. This will allow the user to access the processing results generated by Linux programs from Windows Workstation.

To create the mapping point in Linux, we edited the file `"/etc/samba/smb.conf"`. The current configuration for samba is:

```

[MPW_Linux_HP]
comment = MPW Linux Samba Share
path = /home/kaiwang/Documents/
valid users = kaiwang
read only = no
browseable = yes
create mask = 0664
directory mask = 0775
guest ok = no

```

To add the password for samba user `"valid users = kaiwang"`, start the following command in the path `"/etc/samba"`:

```

sudo smbpasswd -a kaiwang

```

To start "samba", start the following command in the path "/etc/samba":
sudo samba restart

4.1.4 RTBP Configuration Files

The configuration files for the RTBP processor can be generated by executing the command
/linux/RTBP/RTBP_GenerateDefaultConfigPrsFiles

After the command is done, 2 ASCII text file that contain the default values of the processor parameters will be generated:

```
modeStartConfigParams_default.prs  
systemStartConfigParams_default.prs
```

4.1.5 Start RTBP Listener

2 additional start up script need to be started up in the background in Linux Server. It will keep "listening" to the RTBP processor requests from MPW.

1. Start the following command in the path "~/Documents/MPW_Linux/linux":
java -jar mpwDaemon.jar
2. Start the following command in the path "~/Documents/MPW_Linux/linux/RTBP":
./RTBP_Run.sh --systemStartParams systemStartConfigParams_default.prs --modeStartPa
modeStartConfigParams_default.prs

4.2 Windows Workstation

4.2.1 MPW Settings File

The same MPW setting file "MPW_Settings" has to be kept on both Windows Workstation and Linux Server. The current settings is the same as in Sec. 4.1.2.

4.2.2 Program Description File

The program description files in the folder "programDescriptionFiles"(as shown in Table 2) has to be adjusted for each processor available in MPW. These files contain the processors' path location and the default processing parameters.

4.2.3 Network Drive Mapping

To map the hard drive on the Linux Server within Windows Workstation, we can right click on "Computer" and click "Map network drive..." with the following path:

```
\\ott-w32672-lx.ottawa.drdc-rddc.gc.ca\MPW_Linux_HP
```

Please make sure to check the box "Connect using different credentials", with samba password created in Sec. 4.1.3.

4.2.4 Matlab Adjustments

When MPW software was delivered, Matlab 2010 was used for the windows version of the processors within MPW. Currently both Matlab 2012 and 2013 was installed on the Windows Workstation. And MPW will look for Matlab 2013 for the processors.

There is some minor changes for the functions between Matlab 2010 and 2013, such as Matlab function "circShift" in 2010 and "circshift" in 2013. Take this function for example, the temporary fix is to manually create "circShift.m" file within Matlab's default working directory and copy all the codes from "circshift.m".

5 RTBP Processor Notes

RTBP is designed to run Linux program only. As a result, RTBP assume Linux environment. This assumption cause some minor issue with dual boot Server because of the format of the file system.

5.1 Samba

The format of the Samba mounting point ("/home/kaiwang/Documents/") of the Linux Server does matters for RTBP processor. The file system's format has to be "EXT4" for RTBP to work. We have tried with the format of "NTFS" with proper user permission and RTBP stuck in the system forever without any RTBP processing done.

The issue is that RTBP cannot generate and save the temporary SAR image file with "NTFS" file system. The temporary file was used to write the final SAR image data into it. Once the process for the current image was done, final SAR image file will be created from the temporary file. And the temporary file will be deleted immediately. As a result, we will not be able to see the temporary files if the processing went through successfully.

This issue is common with dual-boot operation system. Especially when Windows OS was installed 1st and all the other data storage hard drives will be formatted automatically with "NTFS" as default. Then Linux OS was installed on the same hard drive as Windows OS with different partition. Typical Linux program still works OK with "NTFS", RTBP is the only issue observed currently.

5.2 Raw Data Location

The raw data has to be on the Linux Server for RTBP to work, even though the location(path) of the file was selected in Windows Workstation within MPW. This issue was observed by selecting the raw data location file in Windows MPW as:

```
C:\Users\kai.wang\Documents\DRDC\MPW\Raw_Data\
```

When Linux Server received the processing order from MPW, then path became the following:

```
/C:/Users/kai.wang/Documents/DRDC/MPW/Raw_Data/
```

The direction of "\" became "/". With the path containing "C:", Linux Server cannot find the raw data file to read. As a result, RTBP returned an error message.

This is not a problem need to be fixed. Because we do not want Linux RTBP to read the raw data that saved on Windows through LAN, since this will significantly slow down the

computational time of the processing.

References

- [1] C. Herbert, K. Hagen, L. Diehl, P. Lim and T. Pilson "User Manual for the Multi-Purpose Workstation," *Contract Report*, Ref ZS-MA-53-7776, March 2015.
- [2] K. Hagen, C. Herbert, P. Lim and T. Pilson "Multi-Purpose Workstation (MPW) System Design Document," *Contract Report*, Ref ZS-DD-53-6875, December 2014.
- [3] Y. Zhang and P. Lim "User Manual for the XWEAR Real Time Back Projection Processor," *Contract Report*, Ref ZC-MA-53-0312, October 2013.
- [4] V. Mantle, G. Gavidson and P. Lim "DAS Software Support Task #33 Back-Projection Processor Implementation and Testing Report," *Contract Report*, Ref ZC-MA-53-0312, October 2013.