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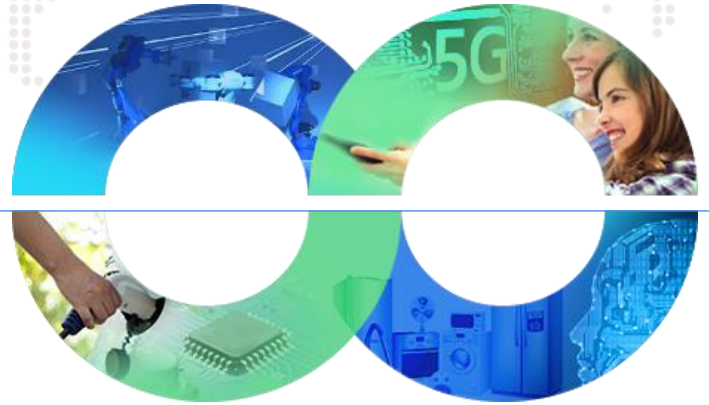
STA2HTM User Guide

Albert Li, 01/25/2021



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How to install STA2HTM package

- **Check STA2HTM in the Github**
  - https://github.com/icdop/sta2htm/
- **Download the STA2HTM package from Github and unpack it**
  - https://github.com/icdop/sta2htm/releases
- **Install the required Linux packages**
  - gnuplot
  - tree
- **Follow the README instruction to run the testcase run/01_sta**
  - % source setup.cshrc
  - % cd run/01_sta
  - % make run

How to setup STA2HTM run directory

- **Prepare STA timing reports generated by Primetime**
  - Recommended directory structure for MMMC
    - **$STA_RPT**/<Mode>/<Corner>/$sta_check.rpt
- **Create STA2HTM setup directory .sta/ under $STA_RPT**
- **Edit Corner definition file (sta2htm.corner):**
  - **$STA_RPT** /.sta/sta2htm.corner

```
000     000_TT
151     151_ML
157     157_BC
231     231_WCL
258     258_WC
```

- **Edit STA2HTM configuration file (sta2htm.cfg):**
  - **$STA_RPT** /.sta/sta2htm.cfg

```
# STA report filename filter : $STA_RPT_PATH/$STA_RPT_FILE
set STA_RPT_PATH {$sta_mode/$corner_name}
set STA_RPT_FILE {$sta_check$sta_postfix.rpt*}

# STA mode name list
set STA_MODE_LIST "func scan"

# STA scenario table ($sta_mode,$sta_check) => "$sta_corner ...."
set STA_CORNER(func,setup) "000 157 231 258"
set STA_CORNER(func,hold)  "000 151 157 258"
set STA_CORNER(scan,setup) "000 157"
set STA_CORNER(scan,hold)  "000 157 258"
```

```
apr0-0122/
├── func
│   ├── 000_TT
│   │   ├── hold.rpt
│   │   └── setup.rpt
│   ├── 151_ML
│   │   └── hold.rpt
│   ├── 157_BC
│   │   ├── hold.rpt
│   │   └── setup.rpt
│   ├── 231_WCL
│   │   └── setup.rpt
│   └── 258_WC
│       ├── hold.rpt
│       └── setup.rpt
└── scan
    ├── 000_TT
    │   ├── hold.rpt
    │   └── setup.rpt
    └── 157_BC
        └── hold.rpt
```

How to generate STA2HTM reports

- **CMD: sta_init_dir <STA_RUN> <STA_RPT>**
  - Create a run directory $(STA_RUN)
  - Copy setup directory $(STA_RPT)/.sta to the rundir $(STA_RUN)
  - Link the report directory $(STA_RPT) to STA under run directory

- **Modify configuration file sta2htm.cfg**
  - Review the mode/check/corner combinations

- **CMD: sta_rpt_uniq_end –sum_dir uniq_end –sta_check setup**
- **CMD: sta_rpt_uniq_end –sum_dir uniq_end –sta_check hold**
  - Process the timing reports of specific timing check and merge multi-corners violation points

- **CMD: sta_gen_index –sum_dir uniq_end**
  - Generate index.htm under $(STA_RUN)/uniq_end

Dashboard of MMMC STA Reports (index.htm)

[@Index] [@Mode] [@Check] [@Corner]

GOLDEN-0122/uniq_end/

```
set STA_RPT_PATH {$sta_mode/$corner_name}
set STA_RPT_FILE {$sta_check$sta_postfix.rpt*}

set STA_MODE_LIST "func scan"
set STA_CHECK_LIST "setup hold"

set STA_CORNER(func,setup) "000 157 231 258"
set STA_CORNER(func,hold)  "000 151 157 258"
#set STA_CORNER(scan,setup) "000 157"
set STA_CORNER(scan,hold)  "000 157 258"
```

STA2HTM Configuration file (.sta/sta.cfg)

MMMC STA Report Extraction Status & Associated Report

Mode	Check	Corner	NVP	WNS	TNS	STA Report
func	setup	000_TT	8	-57.43	-194.64	/home/ISSBG/GITHOME/sta/run/reports/apr0-0122/func/000_TT/setup.rpt
		157_BC	0	0.0	0.0	/home/ISSBG/GITHOME/sta/run/reports/apr0-0122/func/157_BC/setup.rpt
		231_WCL	28	-114.56	-656.93	/home/ISSBG/GITHOME/sta/run/reports/apr0-0122/func/231_WCL/setup.rpt
		258_WC	28	-84.05	-422.68	/home/ISSBG/GITHOME/sta/run/reports/apr0-0122/func/258_WC/setup.rpt
func	hold	000_TT	13	-125.26	-580.13	/home/ISSBG/GITHOME/sta/run/reports/apr0-0122/func/000_TT/hold.rpt
		151_ML	20	-1.77	-17.65	/home/ISSBG/GITHOME/sta/run/reports/apr0-0122/func/151_ML/hold.rpt
		157_BC	32	-1.48	-19.64	/home/ISSBG/GITHOME/sta/run/reports/apr0-0122/func/157_BC/hold.rpt
		258_WC	3	-50.81	-115.31	/home/ISSBG/GITHOME/sta/run/reports/apr0-0122/func/258_WC/hold.rpt

Index Dashboard of MMMC STA Reports

[@Index] [@Mode] [@Check] [@Corner]

GOLDEN-1114/uniq_end/

Click the link to access One page Multi-corners Summary

Mode	Check	Corner	NVP	WNS	TNS	STA Report
func	setup	000_TT	0	0.0	0.0	/home/ISSBG/GITHOME/sta/run/01_sta/report/func/000_TT/setup.rpt
		157_BC	0	0.0	0.0	/home/ISSBG/GITHOME/sta/run/01_sta/report/func/157_BC/setup.rpt
		258_WC	11	-114.56	-373.57	/home/ISSBG/GITHOME/sta/run/01_sta/report/func/258_WC/setup.rpt

Mode	Check	Corner	NVP	WNS	TNS	STA Report
func	hold	000_TT	2	-5.26	-5.87	/home/ISSBG/GITHOME/sta/run/01_sta/report/func/000_TT/hold.rpt
		151_ML	20	-1.77	-17.65	/home/ISSBG/GITHOME/sta/run/01_sta/report/func/151_ML/hold.rpt
		157_BC	32	-1.48	-19.64	/home/ISSBG/GITHOME/sta/run/01_sta/report/func/157_BC/hold.rpt
		258_WC	3	-50.81	-115.31	/home/ISSBG/GITHOME/sta/run/01_sta/report/func/258_WC/hold.rpt
scan	hold	000_TT	0	0.0	0.0	/home/ISSBG/GITHOME/sta/run/01_sta/report/scan/000_TT/hold.rpt
		151_ML	11	-64.24	-297.79	/home/ISSBG/GITHOME/sta/run/01_sta/report/scan/151_ML/hold.rpt
		258_WC				*

[@Index] [@Mode] [@Check] [@Corner]

GOLDEN-1114/uniq_end/

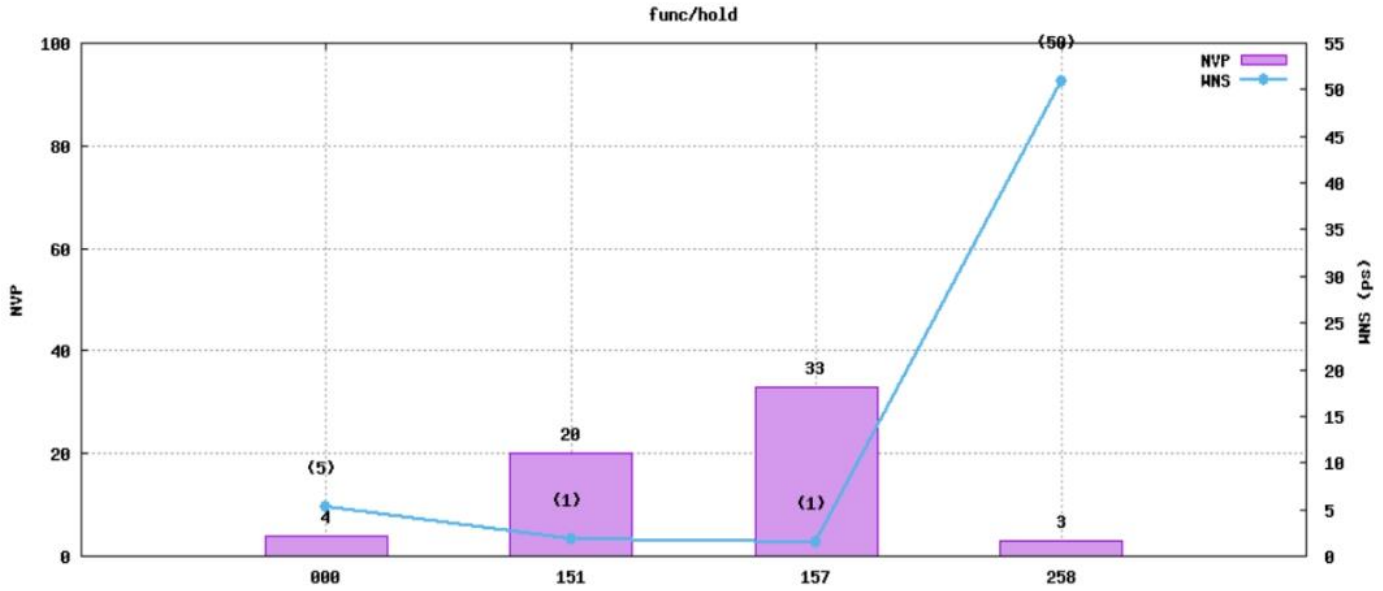
Corner	func /setup	func /hold	scan /hold
000_TT	.	4	.
151_ML	-	20	11
157_BC	.	33	-
258_WC	11	3	*

* Missing STA report files

One Page Summary of Multi-Corners STA Reports

[@Index] [@Mode] [@Check] [@Corner]

GOLDEN-1114/uniq_end/func/hold



Slack	Accum	NVP
0	41	29
-1	12	8
-2	4	0
-3	4	0
-4	4	0
-5	4	1
-10	3	0
-15	3	0
-20	3	0
-25	3	0
-30	3	2
-40	1	0
-50	1	1
-100	0	0
-150	0	0
-200	0	0
-300	0	0
-500	0	0
-1000	0	0

Slack Histogram

#	Mode	Check	Corner	Waive	NVP	WNS	TNS	Clock	Block	STA Report
1	func	hold	000_TT	.	4	-5.26	-11.74	2	1	STA/func/000_TT/hold.rpt
2	func	hold	151_ML	.	20	-1.77	-17.65	5	1	STA/func/151_ML/hold.rpt
3	func	hold	157_BC	.	33	-1.48	-20.69	8	1	STA/func/157_BC/hold.rpt
4	func	hold	258_WC	.	3	-50.81	-115.31	2	2	STA/func/258_WC/hold.rpt
						-50.81	-165.39			

STA Report Location

Multi-Corners Uniquify Violation End Point Report

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GOLDEN-1114/uniq_end/func/hold

Uniquify Violation End Point

No	000	151	157	258	WNS	WCorner	PathGroup	InstancePin
1	.	.	-1.05	.	-1.05	157	**clock_gating_default**	u_core/u_spi/u_spi_txrx/clk_gate_buf_rxd_reg/latch/E
2	.	.	.	-31.41	-31.41	258	CLK_DDR_PHY_pub_ctl_0	u_ddr_phy/dfi_address[1]
3	.	.	.	-33.09	-33.09	258	CLK_DDR_PHY_pub_ctl_0	u_ddr_phy/dfi_address[4]
4	.	.	.	-50.81	-50.81	258	CLK_DDR_PHY_pub_ctl_0	u_ddr_phy/dfi_address[8]
5	.	-0.57	-0.76	.	-0.76	157	CLK_DI_ISP	u_core/u_isp_top/u_isp_exp_v2_sram_wrapper/gen_rf_128x19_u_rf_128x19/A[2]
6	.	-0.77	-0.72	.	-0.77	151	CLK_DI_ISP	u_core/u_isp_top/u_r_lscram/gen_sram_512x24_u_sram_512x24/A[5]
7	.	-0.90	-0.82	.	-0.90	151	CLK_DI_ISP	u_core/u_isp_top/u_vsm_ram2a/gen_sram_960x32_u_sram_960x32/A[1]
8	.	.	-0.07	.	-0.07	157	CLK_MCU	u_core/u_ful_regd_slice/payload_reg_a_reg_21_/D
9	.	-0.47	.	.	-0.47	151	CLK_MCU	u_core/u_ful_regd_slice/payload_reg_a_reg_23_/D
10	.	-1.33	-0.33	.	-1.33	151	CLK_MCU	u_core/u_ful_regd_slice/payload_reg_a_reg_43_/D
11	.	-0.54	-0.24	.	-0.54	151	CLK_MCU	u_core/u_ful_regd_slice/payload_reg_a_reg_65_/D
12	.	-1.20	-1.00	.	-1.20	151	CLK_MCU	u_core/u_ful_regd_slice/payload_reg_b_reg_14_/D
13	.	-0.37	-0.87	.	-0.87	157	CLK_MCU	u_core/u_ful_regd_slice/payload_reg_b_reg_24_/D
14	.	-0.45	-0.55	.	-0.55	157	CLK_MCU	u_core/u_ful_regd_slice/payload_reg_b_reg_41_/D
15	.	-0.93	-0.13	.	-0.93	151	CLK_MCU	u_core/u_ful_regd_slice/payload_reg_b_reg_47_/D
16	.	-0.81	-0.61	.	-0.81	151	CLK_MCU	u_core/u_ful_regd_slice/payload_reg_b_reg_58_/D
17	.	-1.57	-1.47	.	-1.57	151	CLK_MCU	u_core/u_ful_regd_slice/payload_reg_b_reg_65_/D
18	.	-0.78	-0.08	.	-0.78	151	CLK_MCU	u_core/u_rev_regd_slice/payload_reg_reg_36_/D

Cross-Clocks Analysis of NVP & WNS

#	Mode	Check	Corner	Waive	NVP	WNS	TNS	Clock
1	func	hold	000_TT	.	4	-5.26	-11.74	2
2	func	hold	151_ML	.	20	-1.77	-17.65	5
3	func	hold	157_BC	.	33	-1.48	-20.69	8
4	func	hold	258_WC	.	3	-50.81	-115.31	2
						-50.81	-165.39	

GOLDEN-1114/uniq_end/func/hold/000_TT

#2 Clocks	WNS	-	1	2
- : -				
1 : CLK_VIP	-5.26	2	1	
2 : CLK_VIP_DIV2	-0.61	2		1

GOLDEN-1114/uniq_end/func/hold/157_BC

#8 Clocks	WNS	-
1 : **clock_gating_default**	-1.05	2
- : -		
2 : CLK_DI_ISP	-0.82	3
3 : CLK_MCU	-1.47	10
4 : CLK_VAE	-0.48	1
5 : CLK_VIDEO_DIV2_ISP	-0.82	3
6 : CLK_VIDEO_ISP	-0.82	3
7 : CLK_VIP	-0.50	1
8 : CLK_XTAL_MCU	-1.48	10

uniq_end/func/hold

#12 Clocks	NVP	WNS	000	151	157	258
1 : **clock_gating_default**	2	-1.05			-1.05	
- : -						
2 : CLK_DDRC_0						
3 : CLK_DDR_PHY_pub_ctl_0	3	-50.81				-50.81
4 : CLK_DI_ISP	6	-0.90		-0.90	-0.82	
5 : CLK_MCU	20	-1.57		-1.57	-1.47	
6 : CLK_VAE	3	-0.58		-0.58	-0.48	
7 : CLK_VIDEO_DIV2_ISP	7	-1.77		-1.77	-0.82	
8 : CLK_VIDEO_ISP	4	-1.76		-1.76	-0.82	
9 : CLK_VIP	3	-5.26	-5.26		-0.50	
10 : CLK_VIP_DIV2	2	-0.61	-0.61			
11 : CLK_XTAL_MCU	10	-1.48			-1.48	
12 : OCC4	11	-64.24		-64.24		

Cross-Blocks Analysis of NVP & WNS

#	Mode	Check	Corner	Waive	NVP	WNS	TNS	Clock	Block
1	func	hold	000_TT	.	4	-5.26	-11.74	2	1
2	func	hold	151_ML	.	20	-1.77	-17.65	5	1
3	func	hold	157_BC	.	33	-1.48	-20.69	8	1
4	func	hold	258_WC	.	3	-50.81	-115.31	2	2
						-50.81	-165.39		

uniq_end/func/hold

#2 Blocks	NVP	WNS	000	151	157	258
- : -						
1 : u_core	57	-5.26	-5.26	-1.77	-1.48	
2 : u_ddr_phy	3	-50.81				-50.81

uniq_end/func/hold/258_WC

#2 Blocks	WNS	-	1	2
- : -				
1 : u_core				
2 : u_ddr_phy	-50.81	3	3	

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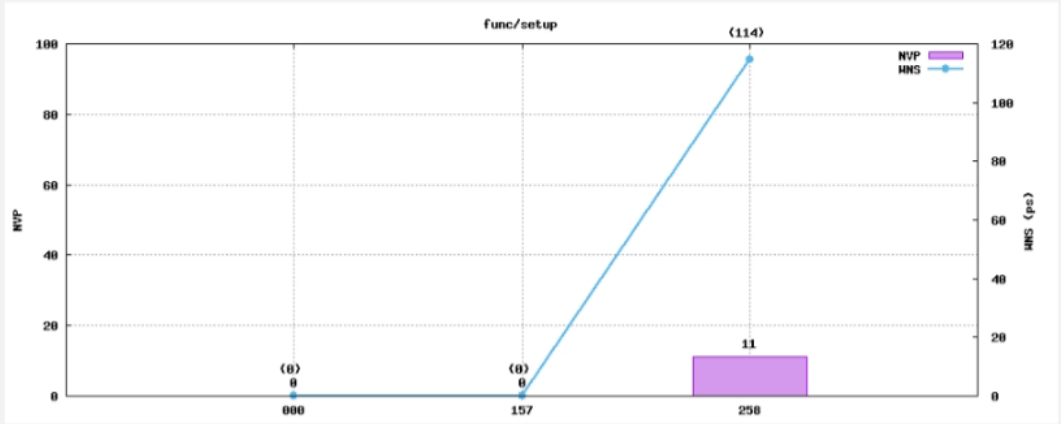
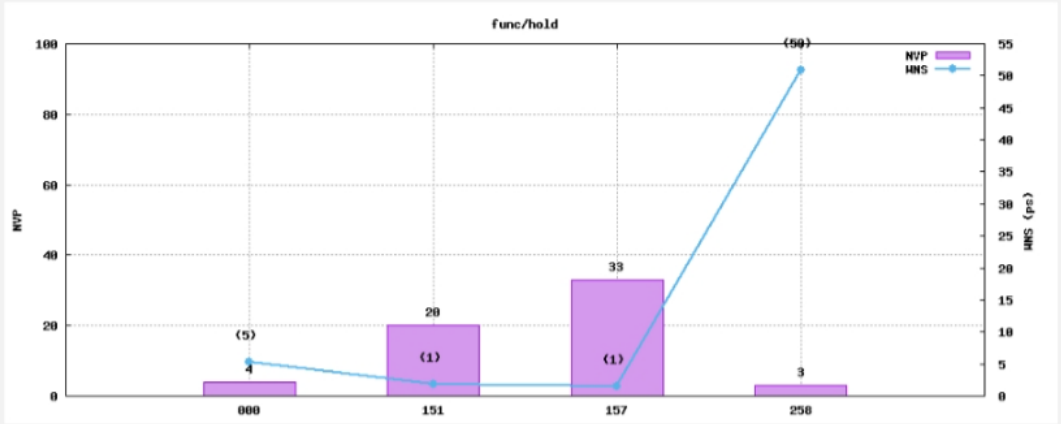
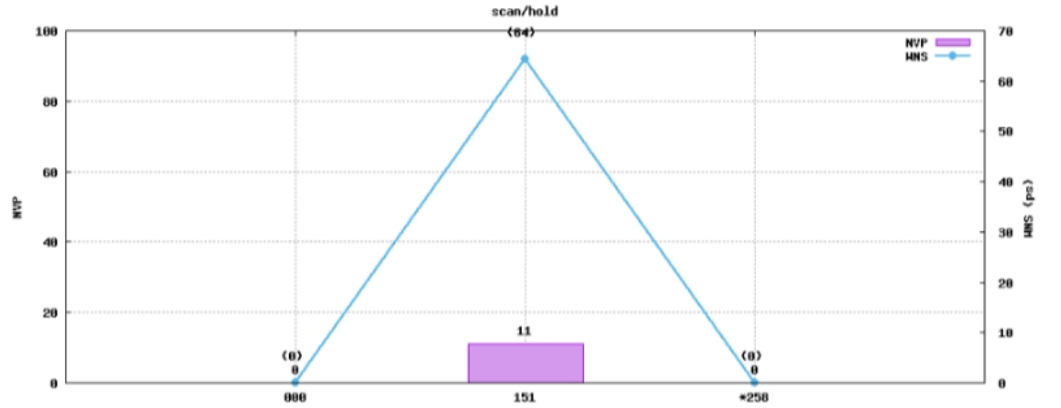
Some Other HTML Report

Metrix of MMMC STA Report

[@Index] [@Mode] [@Check] [@Corner]

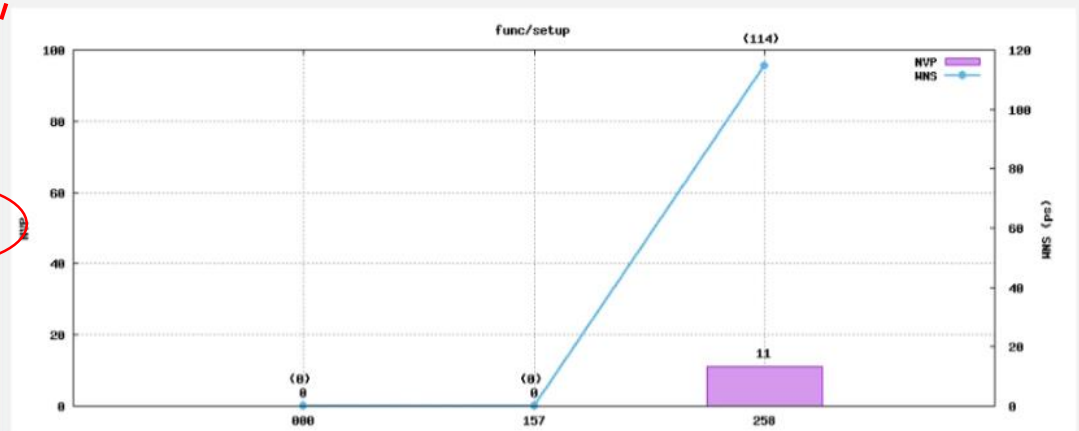
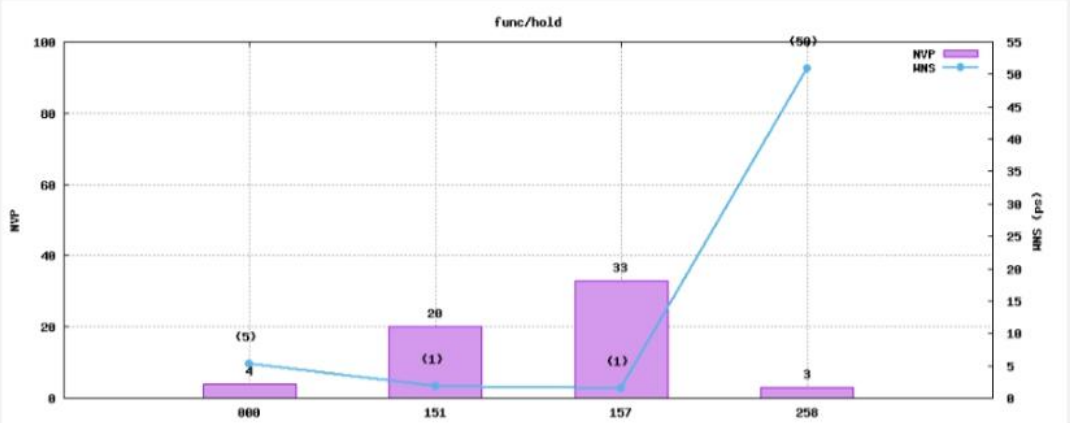
GOLDEN-1114/uniq_end/

Mode	setup	hold
func		
scan		

Summary of Single Mode STA Reports

[@Index] [@Mode] [@Check] [@Corner]

GOLDEN-1114/uniq_end/ (func) (scan)

Mode	setup	hold
func		

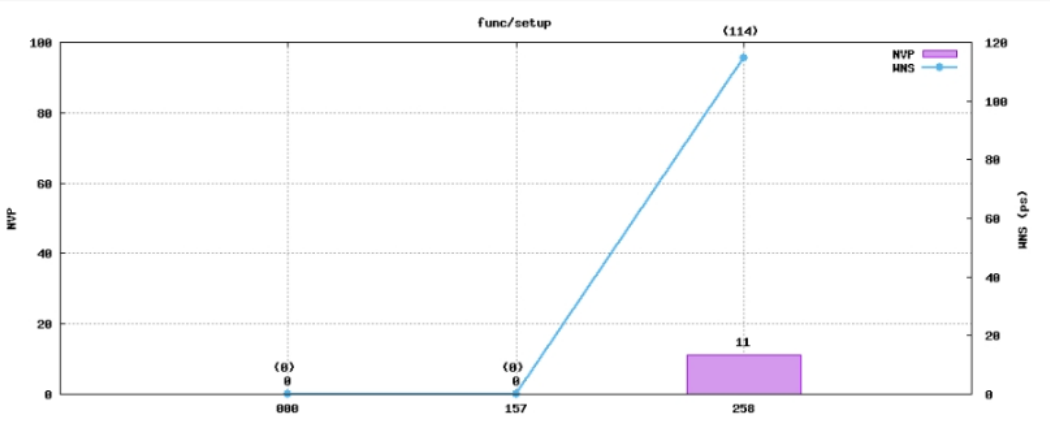

```
# Mode : func
#========== ========== ========== ========== ==========================
#       REAL     WAIVED        NVP        WNS PathGroup
#========== ========== ========== ========== ==========================
          1          0          1     -14.99  VCLK_APB
          2          0          2    -114.56  VCLK_CAN
          4          0          4      -9.43  VCLK_DO
          3          0          3     -97.43  VCLK_FLH
          1          0          1      -8.06  VCLK_MCU08
#========== ========== ========== ========== ==========================
#        11          0         11    -114.56  5
#========== ========== ========== ========== ==========================
```

```
# Mode : func
#========== ========== ========== ========== ==========================
#       REAL     WAIVED        NVP        WNS PathGroup
#========== ========== ========== ========== ==========================
          1          0          1      -1.05  **clock_gating_default**
          3          0          3     -50.81  CLK_DDR_PHY_pub_ctl_0
          3          0          3      -0.90  CLK_DI_ISP
         11          0         11      -1.57  CLK_MCU
          2          0          2      -0.58  CLK_VAE
          5          0          5      -1.77  CLK_VIDEO_DIV2_ISP
          3          0          3      -1.76  CLK_VIDEO_ISP
          2          0          2      -5.26  CLK_VIP
          1          0          1      -0.61  CLK_VIP_DIV2
         10          0         10      -1.48  CLK_XTAL_MCU
#========== ========== ========== ========== ==========================
#        41          0         41     -50.81  10
#========== ========== ========== ========== ==========================
```

Setup Check Summary of MMMC STA Reports

[@Index] [@Mode] [@Check] [@Corner]

GOLDEN-1114/uniq_end/ (setup) (hold)

Mode	setup	
func		
scan		


```
# GOLDEN-1114/uniq_end
#ID           NVP         WNS
#---- ---------- ----------
000             0       -0.00
157             0       -0.00
258            11      114.56
```

Hold Check Summary

[@Index] [@Mode] [@Check] [@Corner]

GOLDEN-1114/uniq_end/ (setup) (hold)

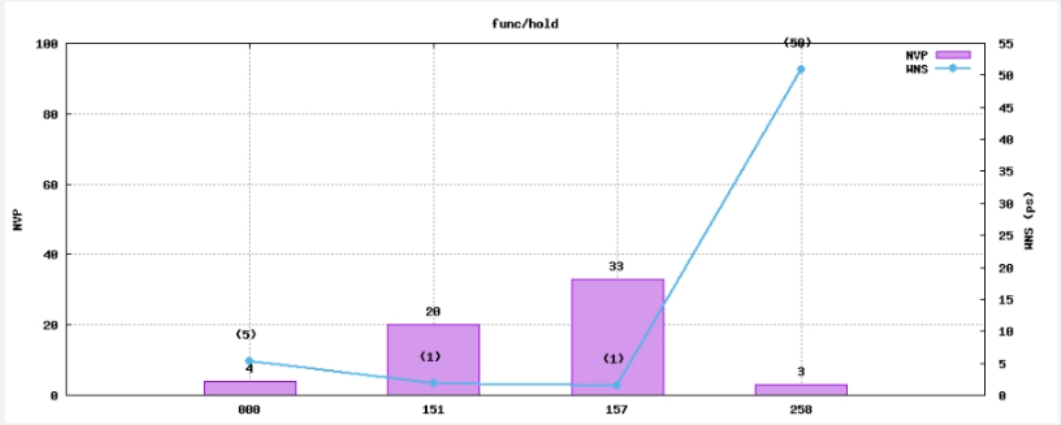
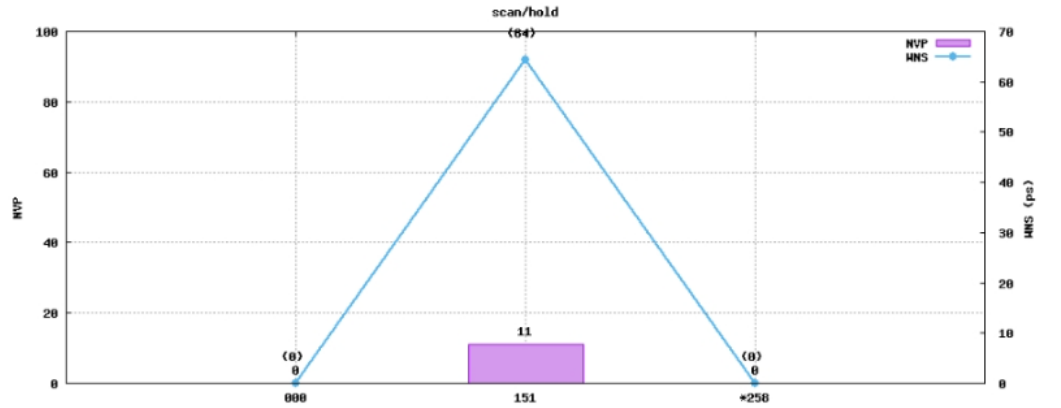
Mode	hold	
func		# GOLDEN-1114/uniq_end #ID NVP WNS #---- ---------- ---------- 000 4 5.26 151 20 1.77 157 33 1.48 258 3 50.81
scan		# GOLDEN-1114/uniq_end #ID NVP WNS #---- ---------- ---------- 000 0 -0.00 151 11 64.24 *258 0 0.00

Table Format Summary of MMMC STA Reports

[@Index] [@Mode] [@Check] [@Corner]

GOLDEN-1114/uniq_end/

Check	func	scan

setup	NVP
	`# GOLDEN-1114/uniq_end`
	`#ID NVP WNS`
	`#---- ---------- ----------`
	`000 0 -0.00`
	`157 0 -0.00`
	`258 11 114.56`	

hold	NVP
	`# GOLDEN-1114/uniq_end`
	`#ID NVP WNS`
	`#---- ---------- ----------`
	`000 4 5.26`
	`151 20 1.77`
	`157 33 1.48`
	`258 3 50.81`
		NVP
		`# GOLDEN-1114/uniq_end`
		`#ID NVP WNS`
		`#---- ---------- ----------`
		`000 0 -0.00`
		`151 11 64.24`
		`*258 0 0.00`

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Text Report Files

Violation files generated with each timing corner

<corner>.vio

```
# File : /home/ISSBG/GITHOME/sta/run/reports/apr0-0122/func/000_TT/setup.rpt
# Report : constraint -path slack_only (Line# 2)
    -54.31 VCLK_APB                        pad_gpio_pa[0]
     -6.00 VCLK_APB                        pad_gpio_pa[1]
     -5.00 VCLK_APB                        pad_gpio_pa[2]
     -4.00 VCLK_APB                        pad_gpio_pa[3]
    -57.43 VCLK_FLH                        pad_sflash_io[2]
    -42.14 VCLK_FLH                        pad_sflash_io[3]
    -21.70 VCLK_FLH                        pad_sflash_io[1]
     -4.06 VCLK_MCU08                      pad_gpio_pb[15]
```

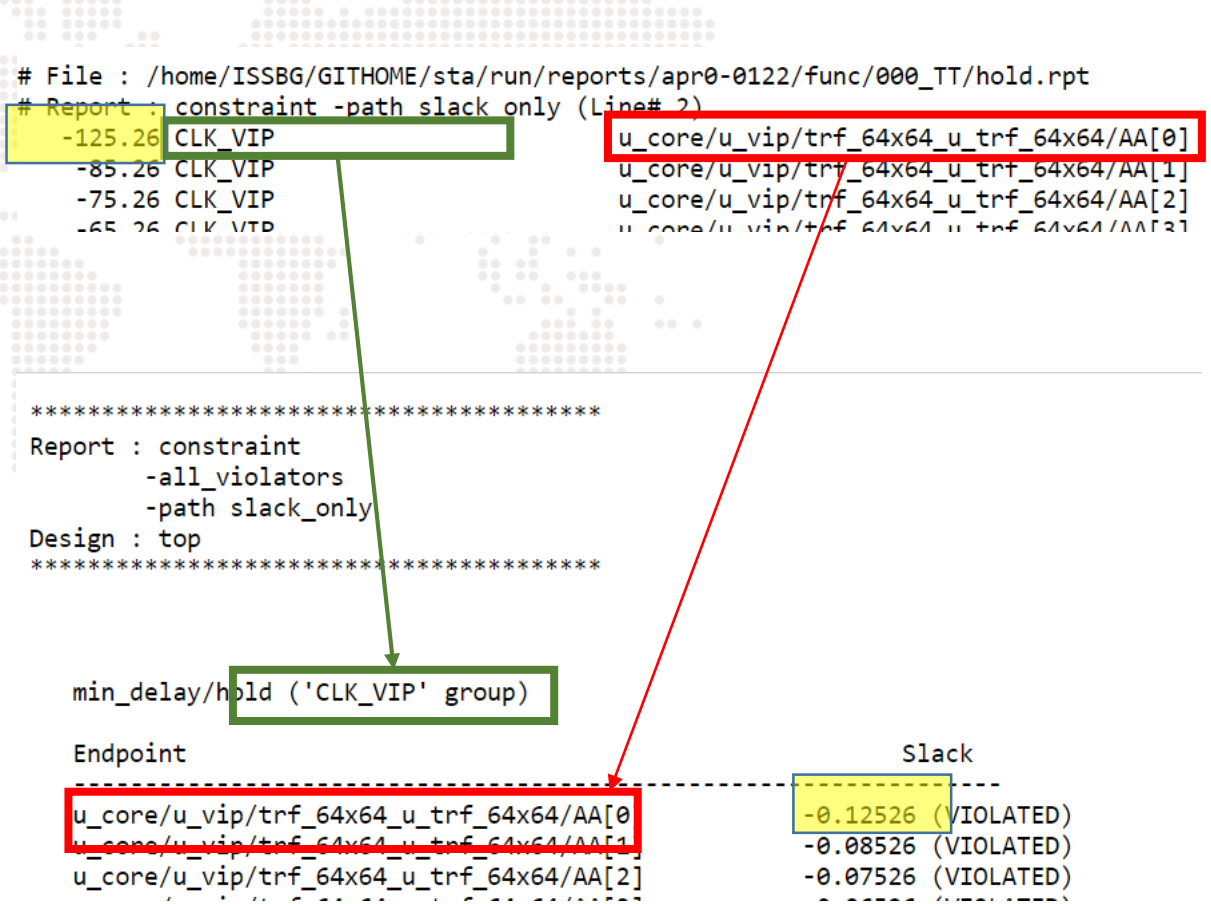
<corner>.wns

```
# Mode : func
#========== ========== ========== ========== ==========================
#      REAL     WAIVED        NVP        WNS PathGroup
#========== ========== ========== ========== ==========================
          4          0          4     -54.31  VCLK_APB
          3          0          3     -57.43  VCLK_FLH
          1          0          1      -4.06  VCLK_MCU08
#========== ========== ========== ========== ==========================
#         8          0          8     -57.43  3
#========== ========== ========== ========== ==========================
```

<corner>.nvp

```
#===================================
#  Slack |       Accum        NVP
#===================================
       0             8          0
      -1             8          0
      -2             8          0
      -3             8          0
      -4             8          2
      -5             6          2
     -10             4          0
     -15             4          0
     -20             4          1
     -25             3          0
     -30             3          0
     -40             3          1
     -50             2          2
    -100             0          0
    -150             0          0
    -200             0          0
    -300             0          0
    -500             0          0
   -1000             0          0
```

Ex1 : Processing Primetime Slack Violation Report



Ex2 : Processing Primetime Detail Violation Report

```
# Report : constraint -verbose (Line# 2)
*001:00050 CLK_DDRC_0                    u_core/u_ddr_ctrl_0/stat_reg_0_/Q
    -50.81 CLK_DDR_PHY_pub_ctl_0         u_ddr_phy/dfi_address[8]
*002:00095 CLK_DDRC_0                    u_core/u_ddr_ctrl_0/stat_reg_0_/Q
    -33.09 CLK_DDR_PHY_pub_ctl_0         u_ddr_phy/dfi_address[4]
*003:00141 CLK_DDRC_0                    u_core/u_ddr_ctrl_0/BANK_x_STM/bnx_t_rCL_reg_2_/Q
    -31.41 CLK_DDR_PHY_pub_ctl_0         u_ddr_phy/dfi_address[1]
```

```
****************************************
Report : constraint
 -all_violators
 -verbose
 -min_delay
Design : top
****************************************


  Startpoint: u_core/u_ddr_ctrl_0/stat_reg_0_
              (rising edge-triggered flip-flop clocked by CLK_DDRC_0)
  Endpoint: u_ddr_phy (rising edge-triggered flip-flop clocked by CLK_DDR_PHY_pub_ctl_0)
  Last common pin: u_core/u_core_gck/CTS_ccl_inv_480185/ZN
  Path Group: CLK_DDR_PHY_pub_ctl_0
  Path Type: min

  Point                                                                                                  Incr       Path
  ------------------------------------------------------------------------------------------------------------------------
  clock CLK_DDRC_0 (rise edge)                                                                        0.00000    0.00000
  clock network delay (propagated)                                                                    1.09920    1.09920
  u_core/u_ddr_ctrl_0/stat_reg_0_/CP (SDFCNQOPTBD2)                                 0.00000    1.09920 r
  u_core/u_ddr_ctrl_0/stat_reg_0_/Q (SDFCNQOPTBD2)                                  0.02956 &  1.12876 r


  u_core/u_lpddr2_ctrl2phy/U19/ZN (ND2OPTPAD16LVT)                                  0.00800 &  1.25965 f
  u_ddr_phy/dfi_address[8] (DDRPHY_top)                                                        0.02936 &  1.28902 f
  data arrival time                                                                                       1.28902
```