TEKNO>LINE®

TSIP-24 IP Tuner to IP Gateway

User's Manual



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Chapter 1 Product Outline

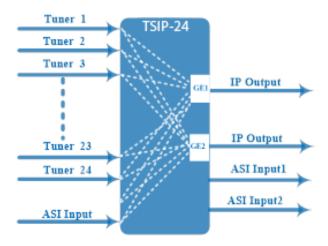
1.1 Outline

TSIP-24 IP Tuner to IP Gateway is a head-end interface conversion device which supports MPTS and SPTS output switchable. It supports 24 MPTS or 512 SPTS output over UDP and RTP/RTSP protocol. It is integrated with tuner demodulation (or ASI input) and gateway function, which can demodulate the signal from 24 tuners into IP package, or directly convert the TS from ASI input and tuner into IP package, then output the IP package through different IP address and ports. BISS function is also embedded for tuner input to descramble your tuner input programs.

1.2 Features

- Support 24 FTA DVB- S/S2/S2X input, 1 ASI input
- Support BISS descrambling
- Support DisEqc function
- 24 MPTS or 512 SPTS output (MPTS and SPTS output switchable)
- 2 GE output (IP address and port number of GE1 and GE2 are different), up to 850Mbps---SPTS
- 2 independent GE output port, GE1 + GE2---MPTS
- Support PID filtering, re-mapping (Only for SPTS output)
- Support "Null PKT Filter" function (Only for MPTS output)
- Support Web operation

1.3 Inner Principle



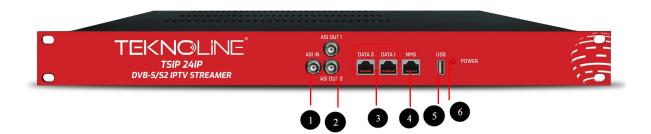
1.4 Specifications

Input	24 tuners inp	24 tuners input +1 ASI inputSPTS/MPTS output						
		Frequency In	950-2150MHz					
		Symbol rate	0.5~45Msps					
	DVB-S	Signal Strength	- 6525dBm					
	DVB-S	FEC	1/2, 2/3, 3/4, 5/6, 7/8					
		Constellation	QPSK					
		Max input bitrate	≤125 Mbps					
		Frequency In	950-2150MHz					
		Same al rata	QPSK/8PSK /16APSK :0.5~45 Msps					
		Symbol rate	32APSK: 0.5~34Msps;					
			QPSK: 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10					
	DVB-S2	FEC	8PSK: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10					
		FEC	16APSK: 2/3, 3/4, 4/5, 5/6, 8/9, 9/10					
Tuner Section			32APSK: 3/4, 4/5, 5/6, 8/9, 9/10					
Tuner Section		Constellation	QPSK, 8PSK, 16APSK, 32APSK					
		Max input bitrate	≤125 Mbps					
		Frequency In	950-2150MHz					
			QPSK/8PSK /16APSK :0.5~45 Msps					
		Symbol rate	8APSK: 0.5~40Msps					
			32APSK: 0.5~34Msps					
			QPSK: 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10, 13/45,					
	DVB-S2X		9/20, 11/20					
			8PSK: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10					
		FEC	8APSK: 5/9-L, 26/45-L					
			16APSK: 2/3, 3/4, 4/5, 5/6, 8/9, 9/10, 1/2-L, 8/15-L,					
			5/9-L, 26/45, 3/5, 3/5-L, 28/45, 23/36, 2/3-L, 25/36,					
			13/18, 7/9, 77/90					

			32APSK: 3/4, 4/5, 5/6, 8/9, 9/10, 2/3-L, 32/45, 11/15,				
			7/9				
		Constellation	QPSK, 8PSK, 8APSK, 16APSK, 32APSK				
		Max input bitrate	≤125 Mbps				
BISS	Mada 1 Mad) (deserve the individual and show)				
Descrambling	os) (descramble individual program)						
	512 SPTS IP	mirrored output o	ver UDP and RTP/RTSP protocol through GE1 and GE2				
Output	port (IP address and port number of GE1 and GE2 are different), Unicast and Multicast						
Output	24 MPTS IP output (for Tuner/ASI pass-through) over UDP and RTP/RTSP protocol						
	through GE1 and GE2 port, Unicast and Multicast, 2 ASI output						
Sustam	Web based ma	anagement					
System	Ethernet software upgrade						
	Dimension		482mm×410mm×44mm (W×L×H)				
	Approx weigh	nt	3.6kg				
Miscellaneous	Environment		0~45°C(work); -20~80°C (Storage)				
	Power require	ements	100~240VAC, 50/60Hz				
	Power consum	nption	20W				

1.5 Appearance and Description

Front Panel Illustration:



1	ASI input port
2	ASI output port
3	Data port (GE1&GE2) : IP out port
4	NMS port: Network management interface
5	USB port for upgrade
6	Power indicator

Rear Panel Illustration



1	24 channels RF IN Interface
2	Integrated power switch and socket
3	Grounding Wire

Chapter 2 Installation Guide

2.1 Acquisition Check

When users open the package of the device, it is necessary to check items according to packing list. Normally it should include the following items:

- TSIP-24 IP Tuner to IP Gateway
- Grounding Cable
- RF In and Loop Out Cable
- Power Cord

If any item is missing or mismatching with the list above, please contact local dealer.

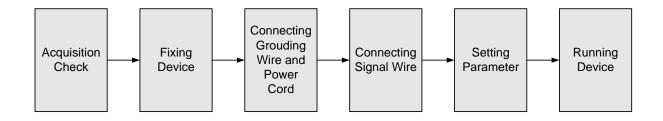
2.2 Installation Preparation

When users install device, please follow the below steps. The details of installation will be described at the rest part of this chapter. Users can also refer rear panel chart during the installation.

The main content of this chapter including:

- Checking the possible device missing or damage during the transportation
- Preparing relevant environment for installation
- Installing gateway
- Connecting signal cables
- Connecting communication port (if it is necessary)

2.2.1 Device's Installation Flow Chart Illustrated as following:



2.2.2 Environment Requirement

Item	Requirement						
	When user installs machine frame array in one machine hall, the						
Machine Hall Space	distance between 2 rows of machine frames should be 1.2~1.5m						
	and the distance against wall should be no less than 0.8m.						
	Electric Isolation, Dust Free						
	Volume resistivity of ground anti-static material:						
Machine Hall Floor	$1X10^7 \text{\sim} 1X10^{10\Omega}$, Grounding current limiting resistance: 1M						
	(Floor bearing should be greater than 450Kg/m ²)						
Environment	$5 \sim 40^{\circ} C(sustainable)$, $0 \sim 45^{\circ} C(short time)$,						
Temperature	installing air-conditioning is recommended						
Relative	20%~80% sustainable 10%~90% short time						
Temperature							
Pressure	86~105KPa						
	Installing rubber strip for sealing door-gaps and dual level						
Door & Window	glasses for window						
Wall	It can be covered with wallpaper, or brightness less paint.						
Fire Protection	Fire alarm system and extinguisher						
	Requiring device power, air-conditioning power and lighting						
D	power are independent to each other. Device power requires AC						
Power	power 100V-240V 50/60Hz 2A. Please carefully check before						
	running.						

2.2.3 Grounding Requirement

- All function modules' good grounding designs are the basis of reliability and stability of devices. Also, they are the most important guarantee of lightning arresting and interference rejection. Therefore, the system must follow this rule.
- Coaxial cable's outer conductor and isolation layer should keep proper electric conducting with the metal housing of device.
- Grounding conductor must adopt copper conductor in order to reduce high frequency impedance, and the grounding wire must be as thick and short as possible.

- Users should make sure the 2 ends of grounding wire well electric conducted and be antirust.
- It is prohibited to use any other device as part of grounding electric circuit
- The area of the conduction between grounding wire and device's frame should be no less than 25mm².

2.2.4 Frame Grounding

All the machine frames should be connected with protective copper strip. The grounding wire should be as short as possible and avoid circling. The area of the conduction between grounding wire and grounding strip should be no less than 25mm².

2.2.5 Device Grounding

Connecting the device's grounding rod to frame's grounding pole with copper wire.

2.3 Wire's Connection

The grounding wire conductive screw is located at the right end of rear panel, and the power switch, fuse, power supply socket is just beside ,whose order goes like this, power switch is on the left ,power supply socket is on the right and the fuse is just between them.

• Connecting Power Cord

User can insert one end into power supply socket, while insert the other end to AC power.

• Connecting Grounding Wire

When the device solely connects to protective ground, it should adopt independent way, say, share the same ground with other devices. When the device adopts united way, the grounding resistance should be smaller than 1Ω .

Caution:

Before connecting power cord to TSIP-24 IP Tuner to IP Gateway, user should set the power switch to "OFF".

Chapter 3 WEB NMS operation

User can only control and set the configuration in computer by connecting the device to web NMS Port. User should ensure that the computer's IP address is different from the TSIP-24's IP address; otherwise, it would cause IP conflict.

3.1 login

The default IP of this device is 192.168.0.136.

Connect the PC and the device with net cable, and use ping command to confirm they are on the same network segment.

I.G. the PC IP address is 192.168.99.252, we then change the device IP to 192.168.99.xxx (xxx can be 0 to 255 except 252 to avoid IP conflict).

Use web browser to connect the device with PC by inputting this device's IP address in the browser's address bar and press Enter.

It displays the Login interface as Figure-1. Input the Username and Password (Both the default Username and Password are "admin".) and then click "Login" to start the device setting.

?	http://192.168.0.136 Authentication"	"Web Server
Name :	admin	
Password :	••••	
Password :	ОК	Cancel

Figure-1

3.2 Operation

Summary \rightarrow Status

When we confirm the login, it displays the status interface as Figure-2

TSIP-24 IP to tuner gateway		
ient		2022-05-26 11:26:08 [Exit]
Summary Estus Parameters System Information > Toper Program Parae > Output System Information > Present Present > Network Passent > Polyput Present > Passent Polyput > Passent Polyput	Software Version: 22 01 23 Duol 150 00 May 12 2022. Hedware Version: 21 01 0 Web Version: 22 01 13 Med Version: 22 03 10 Med Version: 23 04 Med Version: 24 04 Med V	
User can click any item here to enter the corresponding interface to check information or set the parameters.	Figure-2	

Parameter \rightarrow **Tuner input (DVB-S2/S2X)**

From the menu on top side of the webpage, click "Tuner", it displays the interface where users can check the 24 DVB-S/S2/S2X Tuners input status. (Figure-4)

Summary Status	TUNER CONFIC	BURATION							
Parameters Tuner	7 - 6 -	Tuner	T\$ Lock	Signal		Parameters	Action		
Program Parse Program Parse Bas Output System Network Password		DVB-S2XS2	0.000 Mbps	C/N	0% 2% 0.00 dBm 0.00 dB 0.05+00	Safelite Freq: 3840.000 M LNB Freq. 5150.000 M Symbolrate: 27500 K	Eat		
Configuration Primare Date Time Log DVB-S-S2-S2X	2	DVB-S2X/S2	0.000 Mbps	C/N:	(0%) (0%) 0.00 dBm 0.00 dB 0.00+00	Satelite Freq: 3840.0p0 M LNB Freq: 5150.000 M Symbolrate: 27500 K	Edi -	4	
ner input status	3	DVB-S2X/S2	9.600 Mitpe	C/N	0% 0% 0.00 dBm 0.00 dB 0.0E+00	Satelite Freq: 3840.0 LHB Freq: 5150.0001 Symbolrate: 27500 K	Satellite Frequency: LNB Frequency: Symbolrate: Satellite: LNB Voltage:	3840.000 5150.000 27500 1 0V	MHz MHz Ksp: (1-4
	-4	DVB-S2X/S2	0.009 Mbgrs	Strength Power: C/N	0% 0% 0.00 dBm 0.00 dB 0.0E+00	Satelite Freq: 3840 0 LNB Freq. 5150 0001 Symbolrate: 27500 KI	22К:	OFF	Close
				Quality:	0%	()			

Parameter→ **Program Parse**

From the menu on top side of the webpage, click "program Parse", it displays the interface where users can check the 24 tuner parse status. (Figure-5)

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Web Management			
Summary	PROGRAM PARSE		
▶ Status			
Parameters			
▶ Tuner	->Lose -> Locked		
	→1: Tuner DVB-S2X/S2 (prog: 0) →2: Tuner DVB-S2X/S2 (prog: 0)	[0.0/0.0M] *	
Program Parse	→2 Tuner DVB-S20S2 (prog. 0) →3. Tuner DVB-S20S2 (prog. 0)	[0.0/0.0/M]	
▶ Biss	→3. Tuner DVB-S2X/S2 (prog. 0)	0.0/0.0M]	
Output	→5. Tuner DVB-S2X/S2 (prog. 0)	[0 0/0 0M]	
A		[0 0/0 0M]	
System	→7 Tuner DVB-S2X/S2 (prog. 0)	[0 0/0.0M]	
Network	→8: Tuner DVB-S2X/S2 (prog. 0)	[0 0/0 0M]	
▶ Password	→9: Tuner DVB-S2X/S2 (prog. 0)	(0.0/0.0M) e	
Configuration	→10: Tuner DVB-S2X/S2 (prog: 0)	[0.0/0.0M]	
 Firmware 	→11: Tuner DVB-S2X/S2 (prog: 0)	10.0/0 OM	
	→12: Tuner DVB-S2X/S2 (prog: 0)	[0.0/0.0M]	
Date j Time	======================================	[0 O/0 OM]	
▶ Log	++++++++++++++++++++++++++++++++++++	[0 O/0 OM]	
	→15: Tuner DVB-S2X/S2 (prog: 0)	[0.0/0.0M]	
	→16: Tuner DVB-S2X/S2 (prog: 0)	[0.0/0.OM]	
	→17: Tuner DVB-S2X/S2 (prog: 0)	[0.0/0.0M]	
	→18: Tuner DVB-S2X/S2 (prog: 0)	[0.0/0.0M]	
	→19: Tuner DVB-S2X/S2 (prog. 0)	[0.0/0 OM]	
	→20: Tuner DVB-S2X/S2 (prog: 0)	[0.0/0.0M]	
	→21: Tuner DVB-S2X/S2 (prog: 0)	* IMO 0/0.01	

Figure-5

$Parameter \rightarrow BISS$

From the menu on left side of the webpage, clicking "BISS", it displays the interface where users can configure BISS and descramble the input channels (Figure-6).

TSIP-24	IP to tuner gateway	
welcome to use Web		2022-0
Summary Status	BISS CONFIGURATION	
Status Parame Program Pance Program Pance Biss Output System Network Password Configuration Paramac Date Time Log	Biss Channel: Tome 1 Tome 2 Tome 2 Tome 4 Tome 4 Tome 6 Page Total 0. Curr Tome 9 Tome 19 Tome 19 Tome 19 Tome 19 Tome 14 Tome 4 Tome 2 Tome 3 Tome 10 Tome 4 Tome 7 Tome 10 Tome 10 Tome 10 Tome 13 Tome 15 Tome 15 Tome 15 Tome 15 Tome 15 Tome 10 Tome 15 Tome 15 Tome 15 Tome 10 Tome 15 Tome 15	
	Figure-6	
Users can se	et BISS parameter through click "Add" button.	
	Item Config. [close] Alias: SW-1 SW(0x 12 Characters) 123456789abccett Mode: Mode-1	

Parameter \rightarrow **Output:**

From the menu on left side of the webpage, clicking "Output", it displays the interface where users can choose 24 DVB-S/S2/S2X Tuner input and 1 ASI Input programs to output from IP. (Figure-7 and Figure-8)

TSIP-24 IP to tun									
mary									
atus	OUTPUT								
meters	ASI Config	_							
ner		0	utput Channel:	Tuner 1					
ogram Parse			ASI Out Mode:	Package Mode	-				
is									
utput	Stream								
em	Channel Info.(A	larm/Active/Total)	: 0/25/25						
twork					+				
issword		IP Address	Port	Protocol	Data Out	Null PKT Filter	Status	Bit(Act/Max)	
miguration	Tuner 1	224.2.2.2	2001	One	notion Anos	3	•	0.0/0.0 M	1
ite Time	Tuner 2	224.2.2.2	2002	Ope	ration Area	1	•	0.0/0.0 M	1
9	Tuner 3	224.2.2.2		1100	DATA1			0.0/0.0 M	
	Tuner 3		2003	UDP			•	0.0/0.0 M	1
	Tuner 4	224 2 2 2	2004	UDP	DATA1		•	0.0/0.0 M	1
	Tuner 5	224.2.2.2	2005	UDP	DATA1		•	0.0/0.0 M	1
	Tuner 6	224 2 2 2	2006	UDP	DATA1		•	0.0/0.0 M	1
	Tuner 7	224.2.2.2	2007	UDP	DATA1		•	0.0/0.0 M	1
	Tuner 8	224.2.2.2	2008	UDP	DATA1		•	0.0/0.0 M	1
	Tuner 9	224.2.2.2	2009	UDP	DATA1		•	0.0/0.0 M	1
	Tuner 10	224 2 2 2	2010	UDP	DATA1		•	0.0/0.0 M	1
	Tuner 11	224.2.2.2	2011	UDP	DATA1		•	0.0/0.0 M	1
	Tuner 12	224.2.2.2	2012	UDP	DATA1		•	0.0/0.0 M	1
	Tuner 13	224.2.2.2	2013	UDP	DATA2		•	0.0/0.0 M	1
	Tuner 14	224.2.2.2	2014	UDP	DATA2		•	0.0/0.0 M	1



	tuner gate									
agement										
mary										
latus	OUTPUT									
meters	AS	I Config								
iner			Outp	ut Channel:	ASI	-				
ogram Parse			-	Out Mode:	Package Mode	•				
ss	St	ream								
em										
twork	Cha	innel Into.(A	larm/Active/Total): 0/2	25/25						
ssword			IP Address	Port	Protocol	Data Out	Null PKT Filter	Status	Bit(Act/Max)	1
miguration		Tuner 1	224 2.2.2	2001	UDP	DATA1		•	0.0/0.0 M	1
nware ite Time		Tuner 2	224.2.2.2	2002	UDP	DATA1		•	0.0/0.0 M	1
g										
		Tuner 3	224.2.2.2	2003	UDP	DATA1		•	0.0/0.0 M	
		Tuner 4	224.2.2.2	2004	UDP	DATA1		•	0.0/0.0 M	1
		Tuner 5	224.2.2.2	2005	UDP	DATA1		•	0.0/0.0 M	1
		Tuner 6	224.2.2.2	2006	UDP	DATA1		•	0.0/0.0 M	1
		Tuner 7	224.2.2.2	2007	UDP	DATA1		•	0.0/0.0 M	1
		Tuner 8	224.2.2.2	2008	UDP	DATA1	8	•	0.0/0.0 M	1
		Tuner 9	224.2.2.2	2009	UDP	DATA1	8	•	0.0/0.0 M	1
	т	luner 10	224.2.2.2	2010	UDP	DATA1	8	•	0.0/0.0 M	1
	1	funer 11	224.2.2.2	2011	UDP	DATA1		•	0.0/0.0 M	1
	т	iuner 12	224.2.2.2	2012	UDP	DATA1		•	0.0/0.0 M	1
	т	luner 13	224.2.2.2	2013	UDP	DATA2		•	0.0/0.0 M	1
		uner 14	224 2.2 2	2014	UDP	DATA2		•	0.0/0.0 M	1

Figure-9

System → Network:

Clicking "Network", it displays the interface as Figure-10 where to set network parameters.

TSIP-24 IP to tu	iner gateway
welc	
Summary Status	NETWORK
Parameters	NMS
Program Parse Biss Output System Network	IP Address: 192 160 0.136 Set NMS IP address, th Subnet Hask: 255 255 0 Image Port: Gateway: 192 160 0.1 Image Port: Web Manage Port: 00 192.168.0.136 MAC Address: 20 10 12 34 56 78 192.168.0.136
Password Configuration Firmware Date Time	Activ
▶ Log	DATA1
	DATA2 IP Address: 192 166 2 137 Subnet Mask: 255 255 0 Gateway: 192 166 2 2 MAC Address: 200 12 34 66 72
	. Acob
	Figure-10

System → Password:

From the menu on left side of the webpage, clicking "Password", it displays the screen as Figure-11 where to set the login account and password for the web NMS.

TSIP-24	IP to tuner gateway	
welcome to us	-	2022-
Summary Status	PASSWORD	
Parameters Tuner Program Parse Biss	Modify the login name and password to make the device safely if forget the name or password you can reset it by keyboard. The default login name and password is "admin" Also please note the capital character and lowercase character.	
Cutput System Network Softguration Firmware Date 1 Time	Current UserName: admin Current Password: New DeerName: New Password: Confirm New Password:	
► Log	Acco -	

Figure-11

System \rightarrow Configuration:

From the menu on left side of the webpage, clicking "Configuration", it displays the screen as Figure-12 where to save /restore/Factory Set/Backup/Load your configurations.

TSIP-24 IP to	uner gateway	
use Web Managemen		
ummary	CONFIGURATION	
Status arameters		
Tuner	Save Restore Factory Set Backup Load	
rogram Parse liss		
utput	When you change the parameter, you should save configuration , otherwise the new configuration will lost after reboot.	
em		
ssword nfiguration		Save config
nware e Time		
	E 10	
	Figure-12	

System \rightarrow Firmware:

From the menu on left side of the webpage, clicking "Firmware", it displays the screen as Figure-13 where to update firmware for the device.

e to use Web Mani		
mary itus	FIRMWARE	
meters ner ogram Parse	Warning: 1. Upgrade firmware(software and hardware) to get new function please choose the right firmware to upgrade if you use a wrong file, the device may not work.	
s tput	2. Upgrade will keep a long time please do not tum off the power, otherwise the device will not work. 3. After upgrade you must reboot device manually. SPTS SPTS SPTS SPTS SPTS SPTS SPTS SP	
twork	Current Software Version: 22 01 23 Build 158 SP15	
nfiguration mware te Time	Current Hardware Version: 01010 LIMPTS	
9	can start to work.	

Figure-13

System → Date/time:

From the menu on left side of the webpage, clicking "Date/time", it displays the screen as Figure-14 where to update Date and time information for the device.

TSIP-24 IP to tur	iner gateway			
ome to use Web Manageme				
Summary Status Parameters	DATE TIME	1970-01-01 00:04:36		
 Tuner Program Parse Biss Output 		(GMT) Greenwich Mean Time, Dublin, Edinburgt •		
System Network Password Configuration	NTP Server 3: NTP Server 4: NTP Server 5:			
Firmware Date Time Log			Set Timezone Set NTP Update from browser	

Figure-14

System \rightarrow Log:

From the menu on left side of the webpage, clicking "Log", it displays the screen as Figure-14 where to log information for the device.

e to use Web Managem	
Summary	
▶ Status	106
Parameters	
▶ Tuper	Log Type: Kernel Log • Auto Refresh: 0 • Excent
	0.000000] Booting Linux on physical CPU 0x0
Program Parse	[0 000000] Linux version 3.19 0-xiinx (root@iocalhost localdomain) (gcc version 4.9.1 (Sourcery CodeBench Lite 2014.11-30)) #161 SMP PREEMPT Thu Apr 21 13.43.17 CST
▶ Biss	0.000000] CPU: ARMv7 Processor [413fc090] revision 0 (ARMv7), cr=18c5387d
▶ Output	[0.000000] CPU; PIPT / VIPT nonaliasing data cache, VIPT aliasing instruction cache
System	[0.00000] Machine model: xtm:zynq-7000 1
	[0.00000] cma: Reserved 16 MIB at 0x0d800000
Network	[0.00000] Memory policy: Data cache writeatloc
Password	[0.00000] On node 0 totalpages: 65536
Configuration	[0.000000] free_area_init_node: node 0, pgdat 40592140, node_mem_map 4fdt0000
Firmware	[0.00000] Normal zone: 512 pages used for memmap
Date Time	0.000000] Normal zone: 0 pages reserved
▶ Log	[0.00000] Normal zone: 65536 pages, LIFO batch:15
	[0.00000] PERCPU: Embedded 9 pageskpu @Atdo400 s8054 r8129 203608 u36664 [0.000000] peru-abic: s8054 r8129 203068 u36564 abic-94096
	Outproved) pcpu-allice, society to 10 (0) 1 Outproved pcpu-allice, society to 10 (0) 1
	0 000000) Built 3 cone order, mobility grouping on. Total pages: 65024
	0.000000 Kernel command line: console=ttyPS0.115200 root=/dev/ram nv earlyprintk
	0 000000 log, but ten individual max cpu contribution: 131072 bytes
	0.000000] log but len total cpu extra contributions: 131072 bytes
	[0.000000] log_but_len min size: 131072 bytes
	[0.000000] log_but_len: 262144 bytes
	[0.000000] early log buf free: 129664(98%)
	[0.000000] PID hash table entries: 1024 (order: 0, 4096 bytes)
	[0.000000] Dentry cache hash table entries: 32768 (order: 5, 131072 bytes)
	[0.000000] Inode-cache hash table entries: 16364 (order: 4, 65536 bytes)
	[0.000000] Memory: 228368K/262144K available (3777K kernel code, 219K nvdata, 1484K rodata, 192K init, 291K bss, 17392K reserved, 16384K cma-reserved, 0K highmem)
	0.000000] Virtual kernel memory layout
	[0.000000] vector : 0xtm0000 - 0xtm1000 (4 kB)
	[0.00000] tumas - 0xfrc0000 - 0xff00000 (3072 kB)
	[0.000000] vmalac: 0x50800000 - 0xf000000 (2752 MB) [0.000000] jommen: 0xxf0000000 - 0x5000000 (256 MB)
	[0.000000] phmai: 0x4000000 (256 hb) [0.000000] phmai: 0x4000000 (25 hb)
	[0.000000] modules (0x500000 -0x5000000 (2 ms) [0.000000] modules (0x500000 -0x5000000 (14 Ms)
	0.000000 int 0x4052c000 0x4055c000 (192.88)

Figure-15