

From: R.V. Balakrishnan MS/D3645
National Semiconductor
P.O. Box 58090
Santa Clara, CA 95052-8090

Date: September 20, 1988

To: Working Group participants
and interested parties

Dear Sir/Madam;

The first BTL (IEEE P1194) Working Group met on September 9th, 1988 hosted by National Semiconductor in Santa Clara. Overall the meeting was a success. The group was able to accomplish its goals for that day, mainly determining and understanding the objectives of the BTL Working Group. There were twelve attendees at the meeting largely from the Futurebus community. Therefore, we strongly encourage more participation from the Pi-bus committee in the up-coming meetings. Please find attached attendance sheet and agenda of the first meeting.

BTL is an acronym for Backplane Transceiver Logic which is a new signalling scheme that was recently proposed and adopted by the IEEE 896.1 standard to overcome the limitations of TTL bus interface circuits in high performance backplane buses. The objective of the BTL Working Group is to standardize the electrical characteristics and performance evaluation methods for the BTL to allow for multiple vendor designs and to provide for compatibility between them. A Project Authorization Request (PAR) for standardizing the BTL specified in Futurebus (IEEE896.1) and Pi-bus (VHSIC Std.) standards was submitted to the IEEE Microprocessor Standards Committee, and a project number has been assigned. Copies of the PAR and the letter from IEEE standards office have been attached.

The next BTL Working Group meeting will be hosted by Signetics in Orem, Utah, on October 31, 1988. Enclosed is the information for the next meeting. Please plan to attend.

Sincerely yours,



R.V. Balakrishnan
(acting chairman)

Minutes from BTL-IEEE P1194 Working Group meeting.(September 9, 1988 meeting)

The first part of the meeting was a presentation given by R.V. Balakrishnan (acting chairman) on the practicality and advantages of BTL in solving the bus driving problems inherent to TTL devices. There were some discussions on reflections, bus loading, crosstalk, transmission line characteristics and power requirements in the backplane environment.

This was followed by a review of the electrical characteristics of Futurebus and Pi-bus in which the working group compared the two. The parameters that are being considered as part of the standard are termination voltage and resistance, output capacitance and inductance, leakage current, Iol, I(available), Vol, Vih, Vil, tr, tf, noise rejection, and Vcl(clamp). (See attached comparison table.) There was a consensus among those present that the similarities were enough that they can be encompassed in a single BTL standard. However, a thorough understanding of each parameter and the reasoning for the values given for them is necessary for evaluation. Therefore, everyone is encouraged to study and determine where and why the electrical characteristics of Futurebus and Pi-bus were taken from and share your ideas in the next scheduled meeting.

Next, the working group agreed upon a set of objectives that will direct their efforts in defining and achieving a BTL standard. Those present agreed that the BTL standard will not specify mechanical parameters (eg. connectors, stub length, and bus impedance) and it will only address the electrical characteristics. In addition to the later, the following objectives were agreed to by the Working Group;

1. Technology independent (Standard should not limit future performance improvements.)
2. Limited to Electrical Compatibility
3. Backward compatibility with existing implementations (eg. Futurebus and Pi-bus)
4. First draft by October 1988
5. Forward final Draft to TCMM by March 1989


Finally, the BTL working group agreed upon the following dates and places for the upcoming meetings,

<u>date</u>	<u>place</u>
October 31, 1988	Orem, Utah
December 2, 1988	to be decided
January 23, 1989	Bay Area
March 10, 1989	Dallas

There were also several action items for the upcoming meetings:

1. First Draft - Rick Henderson
2. Contact, invite, and find sponsor for December 2, 1988 from Pi-bus Committee. -Anatol Koganovich, Anna Cox, and others.
3. Low current minimum Vol. -Jeff West, Paul Borrill, and Joel Martinez
4. Mail minutes and next meeting information to Futurebus and Pi-bus mailing list. -Joel Martinez Anna Cox, and Emil Hahn
5. Questions on Pi-bus electrical specification / Call Pi-bus users. -Jeff West

Sincerely yours,


Joel Martinez
(secretary for 9/9/88 meeting)

Salt Lake International



I-80 →
~50 miles to
Signetics

Salt Lake City

I-80

I-15

- BTL Meeting -

**Backplane Transceiver Logic
IEEE Working Group**

Meeting on October 31, 1988

9 am to 4 pm

Place: Signetics

Contact: Jeff West

Signetics - D7

1275 S. 800 E.

Orem, UT 84058

801-225-6600,

x4613

Lodging, Orem/Provo:

Cottontree Inn, 2230 N. University Pkwy

801-373-7044

Excelsior Hotel, 101 W 100 N, Provo

801-377-4700



I-15

Lehi

American Fork

Pleasant Grove

Lindon



Utah Lake

To Sundance,
Aspen Loop

800 North

Orem

Center Street

State Street

800 East

Signetics lobby
916 E. 1200 S.

Exit
272

12th So. St.

University
Mall

Traffic
Lights...

To
Cottontree,
Excelsior

July 18, 1988



To: All Interested Parties

A Project Authorization Request (PAR) for standardizing the Backplane Transceiver Logic (BTL) specified in Futurebus (IEEE896.1) and PI-Bus (VHSIC Std.) standards, has been submitted to the IEEE Microprocessor Standards Committee. This first BTL (IEEE Pxxx) Working Group meeting is being hosted by National Semiconductor on September 9th, 1988 at the time and place shown below.

BTL is a new signaling scheme that was recently proposed and adopted by the IEEE 896.1 standard to overcome the limitations of TTL bus interface circuits in high performance backplane buses. The objective of the BTL Working Group is to standardize the electrical characteristics and performance evaluation methods for the Backplane Transceiver Logic to allow for multiple vendor designs and to provide for compatibility between them.

This is an invitation to all interested parties to attend the first meeting and set the direction and goals of this effort. Please fill out and return the attached form indicating your area and level of interest. The success of this committee is dependent on your support and participation.

Sincerely,



R. V. Balakrishnan
Acting Chairman,
IEEE Pxxx - BTL Working Group

BTL Working Group meeting:

Day/Date: Friday, September 9, 1988

Place: National Semiconductor Corporation
Building 16
1090 Kifer Road (See Map)
Sunnyvale, Ca. 94086

Time: 9:00 am to 4:00 pm, lunch will be provided



IEEE

STANDARDS OFFICE

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.
345 EAST 47TH STREET, NEW YORK, N.Y. 10017-2394, U.S.A. TELEX 237936

DIRECT NUMBER
(212) 705-7960

September 8, 1988

Mr. Clyde R. Camp
Texas Instruments, Inc.
2313 Merrimac Drive
Plano, TX 75075

Subject: P1194.0 Backplane Electrical Performance Standard

Dear Mr. Camp:

The subject project submittal has been received by the IEEE Standards Office. The assigned project number is P1194.0. This PAR will now be circulated to all liaison representatives to the Standards Board from Groups/Societies and Technical Committees for review and comment.

Final action on P1194.0 will be taken at the October 20, 1988 IEEE Standards Board meeting.

Sincerely yours,

Jane Post
Secretary, NesCom

cc: R.V. Balakrishnan



IEEE

STANDARDS OFFICE

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.
345 EAST 47TH STREET, NEW YORK, N.Y. 10017-2394, U.S.A. TELEX 237936

DIRECT NUMBER
(212) 705-7960

September 8, 1988

Mr. Clyde R. Camp
Texas Instruments, Inc.
2313 Merrimac Drive
Plano, TX 75075

Subject: P1194.1 Backplane Transceiver Logic (BTL) Electrical Characteristics

Dear Mr. Camp:

The subject project submittal has been received by the IEEE Standards Office. The assigned project number is P1194.1. This PAR will now be circulated to all liaison representatives to the Standards Board from Groups/Societies and Technical Committees for review and comment.

Final action on P1194.1 will be taken at the October 20, 1988 IEEE Standards Board meeting.

Sincerely yours,

Jane Post
Secretary, NesCom

cc: R.V. Balakrishnan

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3. Project Title: Backplane Transceiver Logic (BTL) Electrical Characteristics

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4. Scope: Provides for standardization of the electrical characteristics of the type of logic devices known as Backplane Transceiver Logic (BTL), which are currently specified in Futurebus (IEEE896.1) and PI-Bus (VHSIC Std.) This will be the first of several related standards, each addressing a different logic family.

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5. Purpose: To provide a standard for a common set of electrical characteristics for BTL for multiple vendors to design to. This would provide greater compatibility between vendor circuits and encourage this type of logic in future high performance Bus Standards.

BTL WORKING GROUP MEETING

DATE: 9-8-88

#	NAME	COMPANY/ ADDRESS/TELEPHONE	MEMBER/ OBSERVER
	DAN YAKLIN	TEXAS INSTRUMENTS 8390 LBJ FREEWAY P.O. BOX 225474 DALLAS, TX 75265 (214) 997-2348	MEMBER
	JORGE CARBO'	NATIONAL SEMICONDUCTOR, M/S 16-184 MIL/AERO DIVISION 2900 SEMICONDUCTOR DRIVE SANTA CLARA, CA 95052-8090 (408) 721-5814	OBSERVER
	ANNA COX	NATIONALSEMICONDUCTOR, M/S 16-197 INTERFACE MARKETING 2900 SEMICONDUCTOR DRIVE SANTA CLARA, CA 95052-8090 (408) 721-4474	MEMBER
	EMIL HAHN	SIGNETICS - D7. 1275 S. 800 E. OREM, UT 84058 (801) 225-6600	MEMBER
	JEFF WEST	SIGNETICS - D7 1275 S. 800 E. OREM, UT 84058 (801) 225-6600 EXT. 4613	MEMBER
	RICK HENDERSON	NATIONAL SEMICONDUCTOR, M/S D-3645 2900 SEMICONDUCTOR DRIVE SANTA CLARA, CA 95052-8090 (408) 721-4282	MEMBER
	MARK WEITZ	USAF ASD-AFALC/AXT WPAFB OH 45433-6503 (513) 255-5941	OBSERVER

BTL WORKING GROUP MEETING

DATE: 9-8-88

#	NAME	COMPANY/ ADDRESS/TELEPHONE	MEMBER/ OBSERVER
	MARK DAUGHERTY	GENERAL DYNAMICS P.O. BOX 748 FORT WORTH, TX 76101 (817) 763-2801	OBSERVER
	SUREN KODICAL	INTEGRATED DEVICE TECHNOLOGY 3236 SCOTT BLVD. P.O. BOX 58015 SANTA CLARA, CA 95052 (408) 492-8365	MEMBER
	PAUL BORRILL	NATIONAL SEMICONDUCTOR, M/S 16-181 2900 SEMICONDUCTOR DRIVE SANTA CLARA, CA 95052-8090 (408) 721-7443	MEMBER
	JOEL MARTINEZ	NATIONAL SEMICONDUCTOR, M/S D-3645 2900 SEMICONDUCTOR DRIVE SANTA CLARA, CA 95052-8090 (408) 721-4280	MEMBER
	ANATOL KAGANOVICH	SIGNETICS, M/S 30 811 E. ARQUES AVENUE SUNNYVALE, CA 94086 (408) 991-2599	MEMBER
	R. V. BALAKRISHNAN	NATIONAL SEMICONDUCTOR, M/S D-3645 2900 SEMICONDUCTOR DRIVE SANTA CLARA, CA 95052-8090 (408) 721-4283	MEMBER

AGENDA

- 1. ADMINISTRATIVE**
- 2. INTRODUCTION**
- 3. REVIEW AGENDA**
- 4. BTL – OVERVIEW**
- 5. OBJECTIVES**
- 6. NEXT MEETING**
- 7. SPEC COMPARISON**
PIBUS VS. FBUS
- 8. OTHER BUSINESS**

FUTUREBUS AND PI-BUS ELECTRICAL COMPARISON

	Pi-bus		Futurebus		Futurebus Trapezoidal	
	min	max	min	max	min	max
Termination Voltage	1.9V	2.1V	2.058V	2.142V		
Termination Resistance	30Ω	40Ω	38.61Ω	39.39Ω		
Output Capacitance		(5pF) 22pF		(5pF) 10pF		
Output Inductance		27nH				
Leakage Current		100uA	-250uA	100uA		
I _{ol} (dynamic) static	(95mA) 95mA		(100mA) 55mA		(100mA) 48mA	
V _{ol} (full current)		1.15V	0.75V	1.1V		1.2V
V _{ih}	1.6V		1.628V		1.643	
V _{il}		1.45V		1.473V		1.457V
t _r , t _f		9ns		10ns	3ns	10ns
Noise Rejection		4ns				3ns
V _{ol} (partial current)						
V _{cl}						

Return to: Joel Martinez, M/S D3645
National Semiconductor Corp.
P.O. Box 58090
2900 Semiconductor Drive
Santa Clara, Ca. 95052-8090

____ I would like to become a contributing member of this working group.

____ I would like to be an observer. Please add my name to the mailing list.

Name: _____

Company: _____

Address: _____

Phone: _____

My area of contribution/interest: _____

I will be attending the October 31st meeting

____ Yes

____ No

You will receive no further mailings from the BTL (IEEE P1194) working group unless you return this form or attend the meeting.