

IJTAG

Internal Joint

Test Action Group

IEEE 1687 - 2014 Standard.

- IJTAG stands for Internal Joint Test Action Group.
- It is an IEEE 1687-2014 standard.
- JTAG is more focused towards Boundary Scan. IJTAG is more focused towards accessing internal Instruments.
- IJTAG is a serial access network. While JTAG is a parallel access network.
- JTAG is complex to implement and route when internal modules grow in size and complexity.
- IJTAG defines an architecture which connects all the TDR in a single serial chain between ToScanIn and FromScanOut.



Some important terms:

Instrument:

An instrument is any kind of core or IP for which a 1687 compliant interface can be defined.

ICL – Instrument Connectivity Language

The language in which IJTAG describes the interface for an instrument, as well as the connection of these instruments

It is a highly abstracted language, not necessarily a recording of Verilog.

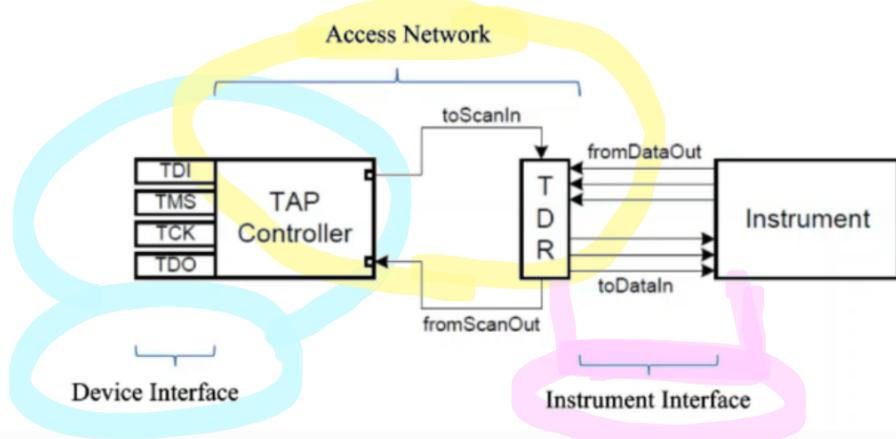
PDL – Procedural Description Language

Language in which IJTAG defines procedures to operate an instrument.

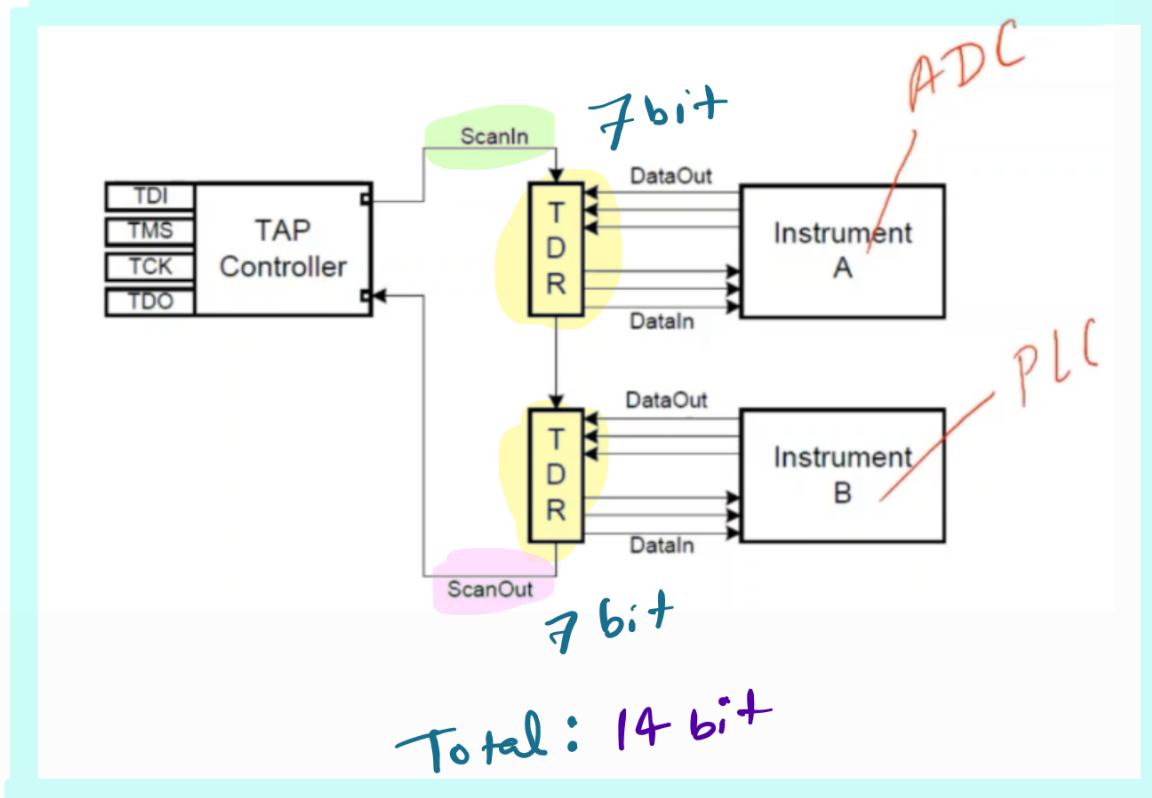
IJTAG

IJTAG facilitates access from chip boundary to instruments embedded within the device through 3 portions of access architecture

- Device interface
- Instrument interface
- Access network

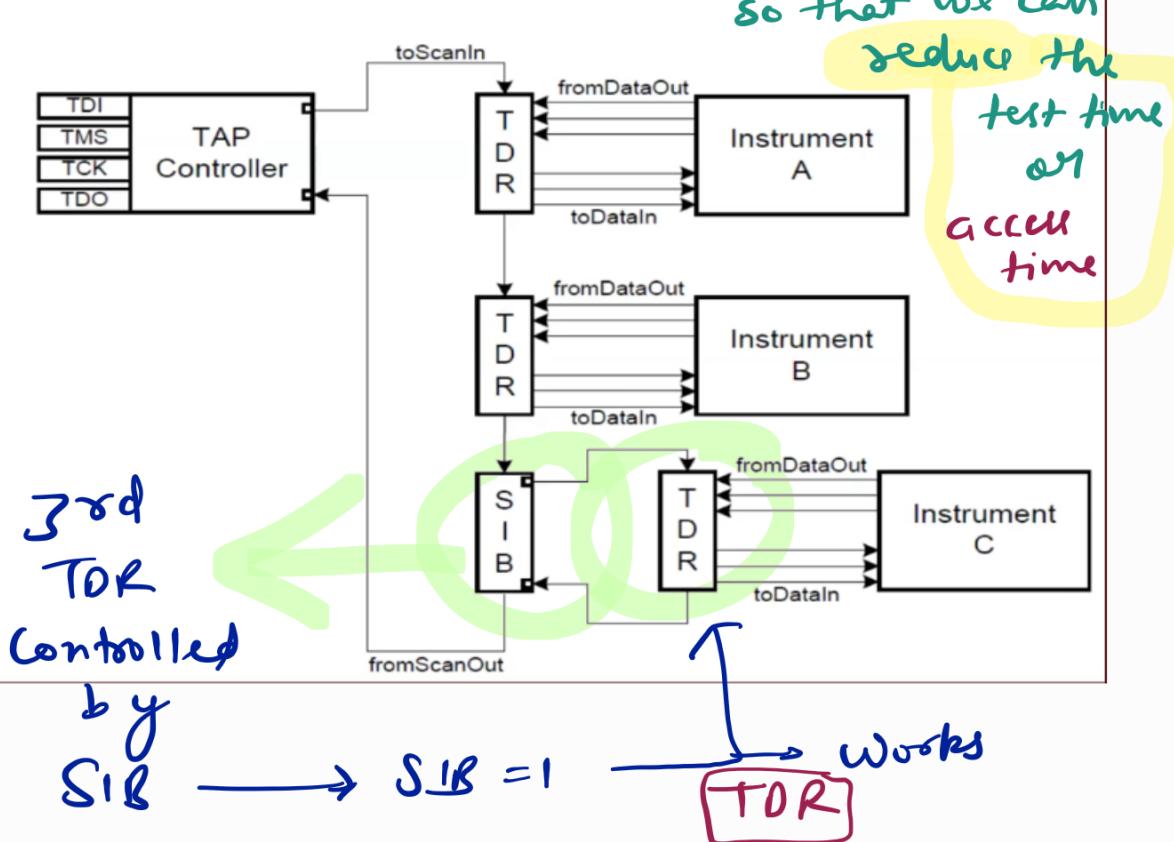


Multiple instruments controlled by TDR are connected in chain as shown below,



Segment Insertion Bit

A Segment Insertion Bit (SIB) is used to convert the IEEE 1687 network into a variable length scan chain.
SIB is always a single bit chain.

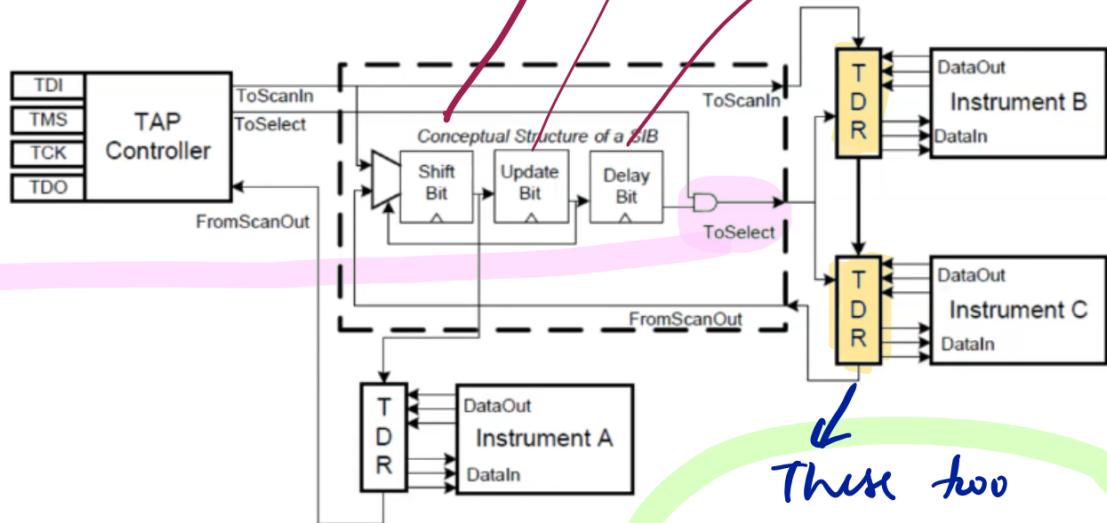


The SIB has a shift bit, update bit and a delay bit.

When Update bit = 1, then TDR is included into the serial chain.

When Update bit = 0, then TDR is bypassed.

ToSelect connects to select TDR

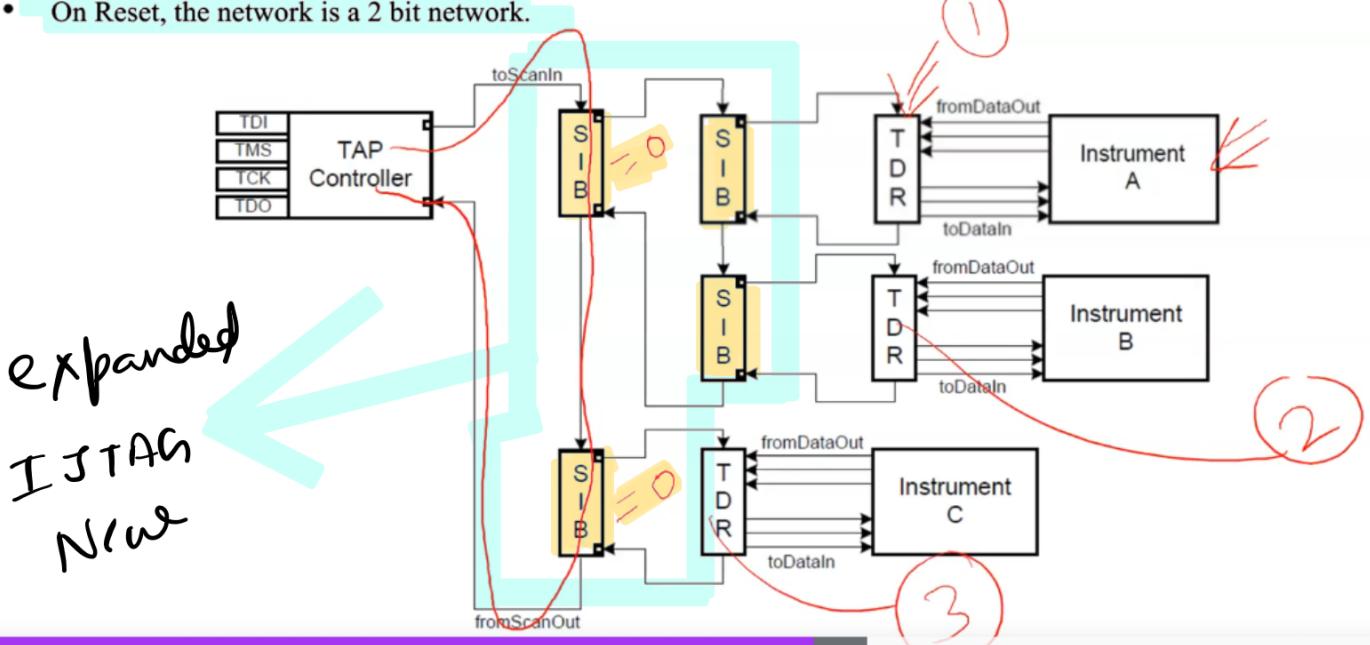


+ve
-ve
+ve

These two
TDR will be
bypassed
if update bit = 0

Understanding Multiple SIB configuration.

- Adding multiple SIBs enables quick access to instruments.
- On Reset, the network is a 2 bit network.



No. Of cycles for DR SCAN operation = 5 + length of DR

No. Of cycles for IR SCAN operation = 6 + length of IR

Lets Assume all TDRs are 32 bit in width

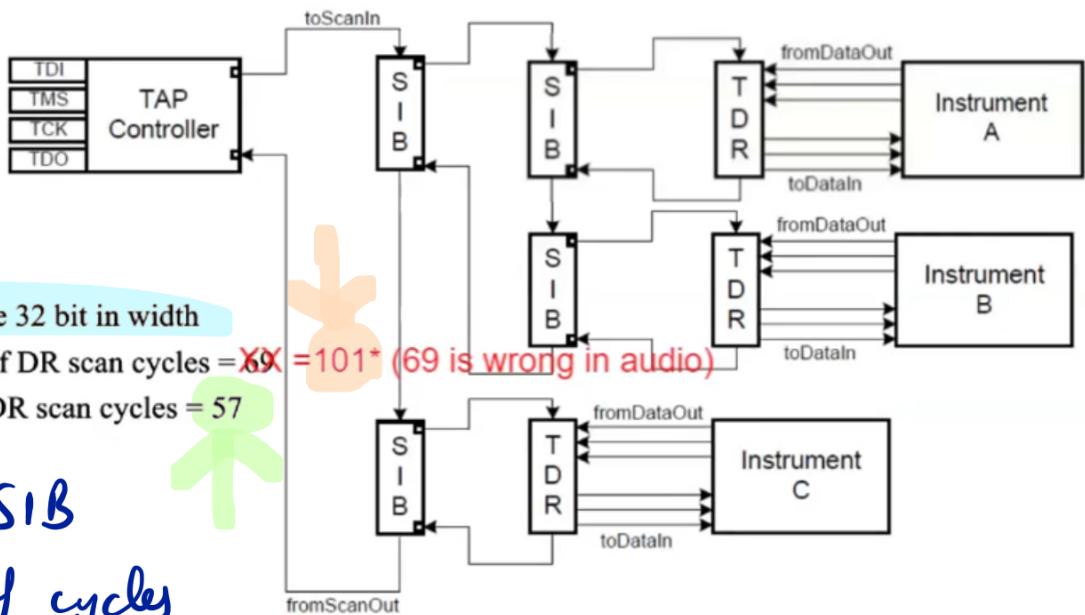
Without SIB, No. Of DR scan cycles = ~~XX~~ = 101* (69 is wrong in audio)

With SIB, No. Of DR scan cycles = 57

with SIB

No of cycles

reduced from 101 → 57



ICL stands for **Instrument Connectivity Language**

ICL is a language in which IJTAG describes about the elements that comprise the instrument access network, their logical connections to each other and to the end points of the network.

It is not a netlist.

Only the behavioral operation of network is represented.

Fundamental entity in ICL is called a module.

How the
instrument
composition is?

The ICL for a module consists of the following two types of information:

1. Hierarchical network structure and instrument interface (required)
2. Parameters, aliases, enumerations, and attributes (optional)

PDL (in short)

Procedural Description Language

PDL stands for **Procedural Description Language**

It is a Language in which IJTAG defines procedures to operate an instrument.

There are 2 PDL levels.

1. PDL Level-0

It is a subset of PDL level-1.

It contains basic commands to document the interactions at the instrument interface level.

2. PDL Level-1

It uses all of level-0 commands.

Additionally it also uses conditions, loops, variables and data structures.

How to
operate?