# Spectra2:
# Benchmarking Capacity

Understanding how to derive benchmarks is important when evaluating a test product for its ability to generate traffic. Vendors might use unique terminology when specifying the capacity of their systems; therefore, results provided by vendors using the same terms do not guarantee the same meaning.

In this application note, we explain to the reader about the method used to determine Spectra2 benchmarks. We also show required information to make an objective comparison between systems, even when capacity is stated in different terms.

## Common Benchmarking Terminology

Various metrics are used in the telecom industry to measure signaling capacity.

- MPS – Messages Per Second
  - Number of individual messages a system can send or receive in a one second time frame
  - Messages are either a request or response

- TPS – Transactions Per Second
  - Number of transactions measured per second
  - Transaction is a sequence of messages beginning with the first request message and its corresponding final response
  - Transactions can contain intermediate responses such as 1XX messages as in SIP

**Comparing messages per second is not useful when evaluating the capacity of protocol test equipment that is generating traffic.**

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- CPS – Calls Per Second
  - Number of call attempts or number of completed calls that occur in a one second time frame
  - Refer to "What is a Call?" for additional information

> **Spectra2 benchmarks are specified in CPS**

- BHCA – Busy Hour Call Attempts
  - Number of calls attempted during a 3,600 second time frame during the busiest hour
  - Not a true measure of capacity because calls might not be complete
  - Used to plan the capacity of communication links

- BHCC – Busy Hour Call Completions
  - Number of calls completed during a 3,600 second time frame during the busiest hour
  - Call is established and released under normal conditions
  - True measure of capacity and CPS specified in Spectra2 literature

Does CPS = TSP = MPS? Are these metrics equivalent? The answer is *sometimes* and depends on the definition of a *call*.

## What is a Call?

CPS is a common term that can sometimes cause confusion and requires an understanding of the term *call*. The term *call* is commonly used to refer to a conventional telephone conversation between two parties. This definition suggests that a SIP or ISUP call contains a series of messages where a call is originated and terminated under normal conditions.
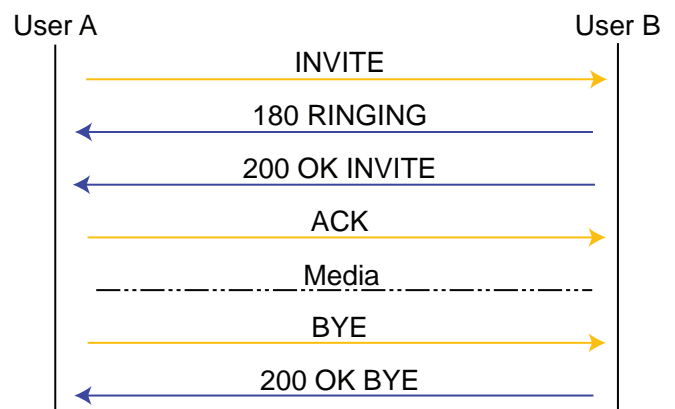
What if the call is not answered? Some view a call as an attempt to set up a dialog between endpoints, whether the call fails or succeeds is not relevant. Protocols such as Diameter and TCAP are not directly used to set up a call between endpoints but are used between elements of a telecommunication network to decide the treatment given to the call. These protocols provide advanced features, authentication, billing, etc., and a call might be viewed as a single transaction.

> **Spectra2's benchmark numbers are based on complete calls, that is, BHCC**

Tektronix views a call as a series of messages that establish and terminate a session in a normal error-free manner. For example, the SIP CPS benchmark is a call containing a successful INVITE message. The following diagram illustrates a call from User A to User B using the SIP protocol for signaling.

> **Spectra2 SIP CPS numbers can be converted to MPS by multiplying by six**



Figure 1 - SIP Call Flow

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The call flow in Figure 1 contains three transactions and six messages. The INVITE message is the call attempt. The SIP 180 RINGING and SIP 200 OK messages constitute the response to the INVITE and count as one transaction. The SIP 200 OK message from the receiver and the resulting SIP ACK message is a separate SIP transaction. At this point, a dialog is established between User A and User B. At some point later, User A decides to end the call. This action causes another transaction

**For the Diameter and TCAP protocols, CPS is the same as TPS**

consisting of a BYE message and its reply with a SIP 200 OK message.

Referring to Figure 2, the TCAP protocol's benchmark call flow contains three messages: QUERY, CONVERSATION, and RESPONSE. When using the DIAMETER Cx protocol, a benchmark call consists of a single send/response transaction containing two messages. A Megaco benchmark call has a total of seven transactions in it based on Figure 3.
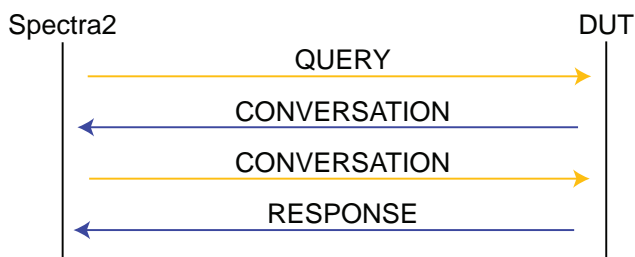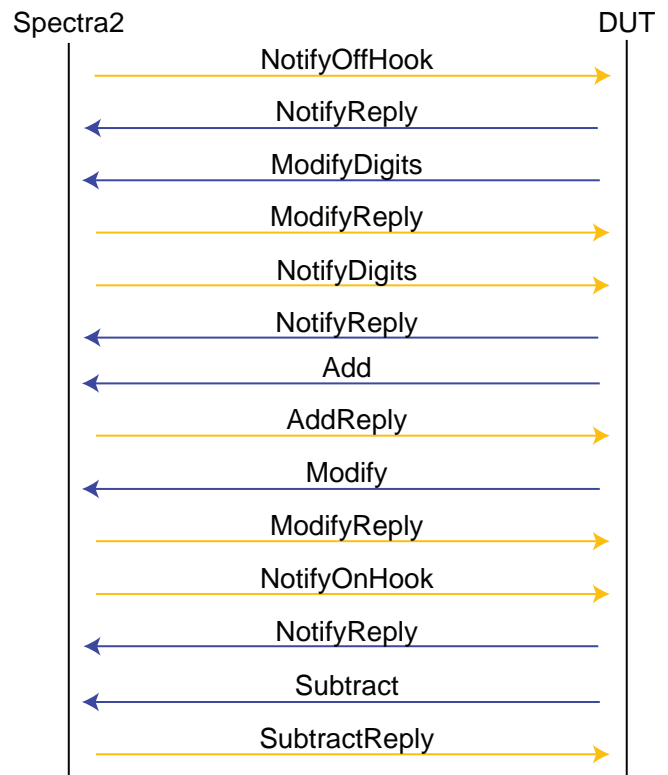
Figure 2 - Script used for TCAP benchmark

Figure 3 - Script used for Megaco benchmark

## Spectra2XL Benchmarks

Vendors commonly use MPS synonymously with CPS; therefore, understanding how to determine the benchmark is important when selecting a test tool. When working with Tektronix, you will always receive a true metric based on real-world modeling. Spectra2XL (Extreme Rackmount Chassis) has been benchmarked with the SIP protocol to support 8,000 CPS. Referring to Figure 1 for the SIP call flow and applying a normalization, Spectra2 generates the following benchmarks:

- 8,000 CPS = 6 x 8,000 = 48,000 MPS because each call is composed of six SIP signaling messages

- 8,000 CPS = 3 x 8,000 = 24,000 TPS because each call is composed of three separate transactions

- 8,000 CPS = 3600 x 8000 = 28.8M BHCC

As you can clearly see, Spectra2XL is the industry leader in signaling capacity.

**Spectra2XL can generate 28.8 Million BHCC resulting in 48,000 SIP MPS**

For more information, please visit www.tektronix.com/spectra2.

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