

# TP3070 COMBO II™ Performance with V.90 56K Modems

National Semiconductor  
Application Note 1156  
Jayson Denning  
November 1999



## PURPOSE

To evaluate the 56K V.90 performance through a trunk card utilizing National Semiconductor's COMBO II codec and to compare this performance to that of an analog line card containing a proprietary codec.

## CONCLUSIONS

- V.90 56K Modems used in this evaluation, connected at a higher data rate through the Trunk Card with the COMBO II codec than through the Analog Line Card with the Proprietary codec.
- The COMBO II-based system achieved a maximum connection rate of 54,666 bps while the system based on the Proprietary codec achieved a maximum of only 50,666 bps.

- The COMBO II-based system performed better on longer loops than the system based on the Proprietary codec.
- Both systems sustained their connection rates, even when transferring large files.

## TEST ENVIRONMENT

The test environment in *Figure 1* was set up entirely on National Semiconductor's premises.

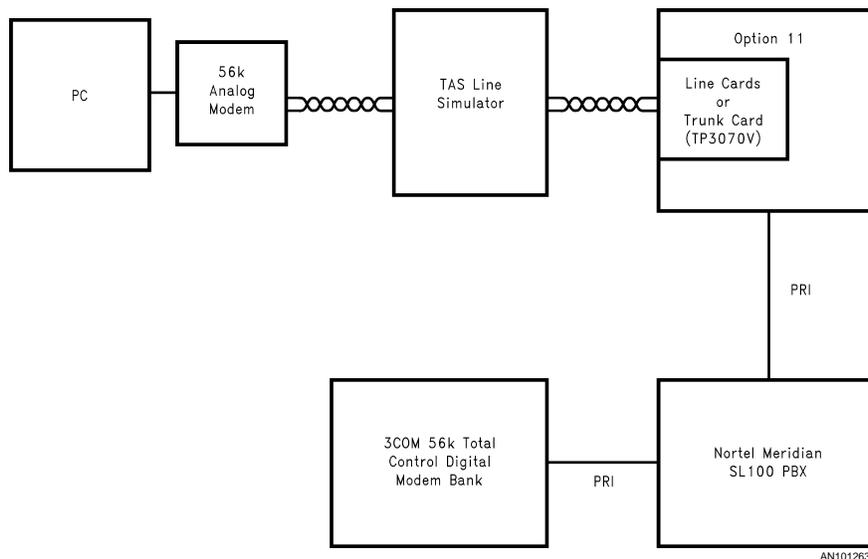


FIGURE 1.

## THE ELEMENTS OF THE SYSTEM

- A PC
- 56K V.90 Analog Modems. Used a 3COM/US Robotics modem and another popular V.90 modem (Modem B)
- A TAS Line Simulator
- A COMBO II-based Trunk Card and an Analog Line Card using a proprietary codec
- A Nortel Meridian SL100 PBX
- A 3COM 56K Total Control Digital Modem Bank with PRI interface

## TEST PROCEDURE

With the Option 11 formatted in Direct-Inward-Dial (DID) mode, we were able to connect the analog modem directly to the Trunk Card. A standard analog phone line was dropped from the Analog Line Card. Using the PC, the analog modem was instructed to seize the trunk or call through the Analog Line Card. The Option 11 then automatically connected the call through the Nortel Meridian SL100 PBX to the digital modem bank. At this time the modems train, negotiating for the highest connection rate. After the connection is complete

COMBO II™ is a trademark of National Semiconductor Corporation.

and the user successfully logged on, the modem software can be queried for the connection rate. This data is then recorded.

To measure connection rates over different loop length conditions, the TAS line simulator was placed in between the analog modem and the Option 11. It can be programmed to simulate many lengths and types of telephone wire.

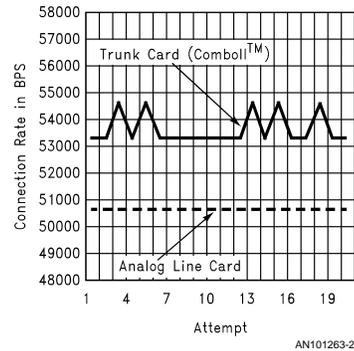
To verify that the connection rate was maintained during data transfers, a large file (12 Meg) was downloaded and the connection rate monitored. The connection rate remained constant for all conditions tested. No degradation was seen for both the Trunk Card and the Analog Line Card.

**DATA**

Table 1 shows the average connection rates based on 20 consecutive connections for each setup. Figure 2 plots all of these connections made using the 3COM/US Robotics modem. The 3COM/US Robotics modem performed better than the Modem B, and the Trunk Card performed better than the Analog Line Card. The maximum connection rate was 54,666 bps seen with the 3COM/US Robotics modem and the Trunk Card (COMBO II). The same 3COM/US Robotics modem and the Analog Line Card (Proprietary codec) produced a maximum connection rate of 50,666 bps.

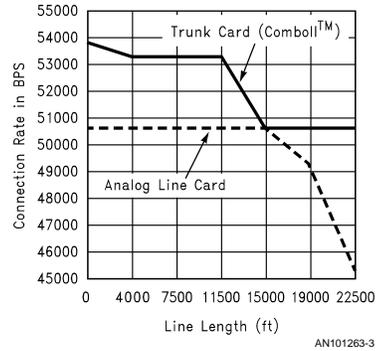
**TABLE 1. Average Connection Rate with 0 Loop Length**

	Trunk Card (COMBO II)	Analog Linecard (Proprietary codec)
3COM/US Robotics Modem	53,666 bps	50,666 bps
Modem B	48,933 bps	46,266 bps

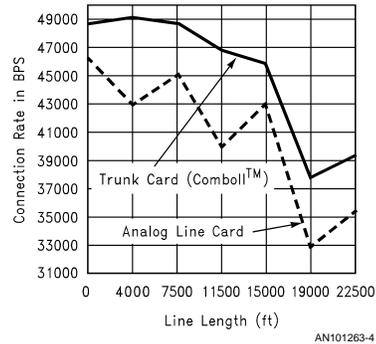


**FIGURE 2. Connection Rate with 0 Loop Length (20 Consecutive Connections with US Robotics Modem)**

Connection rate data collected using different loop lengths is displayed in Figures 3, 4. Data collected using the 3COM/US Robotics modem is in Figure 3 and data from Modem B is in Figure 4. The Trunk Card with the COMBO II performed better than the Analog Line Card for loop lengths in the range tested.



**FIGURE 3. Average Connection Rates vs Line Length (US Robotics V.90 Modem, AWG 26)**



**FIGURE 4. Average Connection Rates vs Line Length (V.90 Modem B with AWG 26)**

**Notes**

**LIFE SUPPORT POLICY**

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT AND GENERAL COUNSEL OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

 **National Semiconductor Corporation**  
Americas  
Tel: 1-800-272-9959  
Fax: 1-800-737-7018  
Email: support@nsc.com

www.national.com

**National Semiconductor Europe**  
Fax: +49 (0) 1 80-530 85 86  
Email: europe.support@nsc.com  
Deutsch Tel: +49 (0) 1 80-530 85 85  
English Tel: +49 (0) 1 80-532 78 32  
Français Tel: +49 (0) 1 80-532 93 58  
Italiano Tel: +49 (0) 1 80-534 16 80

**National Semiconductor Asia Pacific Customer Response Group**  
Tel: 65-2544466  
Fax: 65-2504466  
Email: sea.support@nsc.com

**National Semiconductor Japan Ltd.**  
Tel: 81-3-5639-7560  
Fax: 81-3-5639-7507