corresponding parameter views. *PKTGEN* can be configured and run for up to 16 data links by using the configuration tool within the "*Parameter View.*" In the example, Forth scripts are used to configure and to start packet generation for a single data link.

UMTSCOMP receives the data, collects statistical information and calculates delays. Figure 18 shows the results of a typical test.

3. Conclusion

The K1297 Protocol Tester is a powerful tool for the design, development and deployment of new 3G networks. The K1297 is a comprehensive solution, adding simulation and emulation capabilities and an enhanced graphical user interface to the extensive monitoring functions of its predecessor, the K1205. The K1297 is compact and configurable to help you meet a variety of measurement challenges with ease, including:

- protocol functional tests
- node simulations, where the entire protocol stack is emulated/simulated, including the user plane.
- node tests, where all messages belonging to a message group can be collected.

The K1297 features programming flexibility and a common platform for all protocol testing applications. All bundles include:

- Monitoring
- Protocol simulation
- Emulation
- Sample scripts for message sequences, message pools and predefined emulation stacks
- Simulation Base software with Emulation Scenario Editor (ESE), Message Sequence Chart (MSC), Message Building System (MBS), PFE-Forth based interpreted scripting language

To address the new ATM features in the UMTS, K1297/ATM Software includes:

- Monitor and simulation software for UNI (Q.2931 CS2.1, ATMF UNI3.1, ATMF UNI4.0)
- Monitor and simulation software for NNI (Q.2761 - Q.2764 CS2.1, B-ICI 2.1)
- Monitor and emulation software for 8xSSCOP
- TTCN Compiler for Conformance Test Suites
- Executable Test Suites (SSCOP(SSCF), Q.2931, UNI3.1, Q.2763, MTPL3b)
- Support for AAL 3/4, AAL 5, STM 4, STM 1 optical/electrical/TP, E3/DS3, E1/DS1, ATM 25.6 interfaces.

The following software packages are available:

- UMTS Monitor SW (G20) for Iu-PS user plane interface; incl.: GTP-U (TS29.060) and IP as well as underlying protocols UDP/IP and IP over ATM; English documentation; Required basic package >=V1.0 (7KK1220-0SCxx) and ATM-HW

- UMTS Test SW (G20) for Iu control-plane; incl.: Emulations of SSCOP, MTP3B, SCCP emulation and simulation of AAL2L3(Q.2630.1, Q.2150.2), RANAP(TS25.413) and Mobile Radio Layer 3 (TS24.008); English documentation; Required basic package >= V1.0 (7KK1220-0SCxx) and ATM-HW

- UMTS Test SW (G20) for Iu-PS user plane; incl.: simulation of GTP-U (TS29.060) and emulation of IP packet generator and comparator; English documentation; Requirements (7KK1220-0SCxx) >= V1.0 and ATM-HW

For additional information please also access our web site at www.tektronix.com/commtest.

This first release of the application note presents guidelines for the test engineer who is interested in solutions for the UMTS Iu interface as it was defined by 3GPP in 1999. Updates and solutions for the new Iub and Iur interfaces will follow in the near future. This document is also available at our web site (www.tektronix.com), along with updates and related documents.

Tektronix is committed to the most advanced test solutions for mobile networks. As mobile networks continue to evolve through GPRS, UMTS and cdma2000, we will keep you in the forefront with the latest testing products and methods.

We welcome your comments and suggestions for improving these documents and your ideas for developing other tools to help you meet the measurement challenges of new wireless systems.

4. Appendix I

4.1 Recommended Documents and Standards:

3G TS 23.110	UMTS Access Stratum Services and Functions
3G TS 25.301	Radio Interface Protocol Architecture
3G TS 25.321	Medium Access Control (MAC) Protocol Specification
3G TS 25.322	Radio Link Control (RLC) Protocol Specification
3G TS 25.323	Packet Data Convergence Protocol (PDCP) protocol
3G TS 25.324	Radio Interface for Broadcast/Multicast Services
3G TS 25.331	Radio Resource Control (RRC) Protocol Specification
3G TS 25.401	UTRAN Overall Description
3G TS 25.410	UTRAN Iu Interface: General Aspects and Principles
3G TS 25.411	UTRAN Iu interface Layer 1
3G TS 25.413	UTRAN Iu Interface: RANAP Signaling
3G TS 25.420	UTRAN Iur Interface: General Aspects and Principles
3G TS 25.423	UTRAN Iur interface RNSAP Signaling
3G TS 25.430	UTRAN Iub Interface: General Aspects and Principles
3G TS 25.433	UTRAN Iub interface NBAP Signaling
3G TS 29.060	3rd Generation Partnership Project; Technical Specification Group Core Network; General Packet Radio Service (GPRS); GPRS Tunneling Protocol (GTP) across the Gn and Gp Interface
ETSI ETR 021	Advanced Testing Methods (ATM); Tutorial on protocol conformance testing (Especially OSI standards and profiles) (ETR/ATM-1002)
ETSI GSM 12.04	Digital cellular telecommunication system (Phase 2); Performance data measurements
IETF M3UA	G. Sidebottom et al, "SS7 MTP3-User Adaptation Layer (M3UA draft-ietf-sigtran-m3ua-02.txt (Work In Progress), IETF, 10 March 2000
IETF SCTP	R. Stewart et al, "Simple Control Transmission Protocol," draft-ieft-sigtran-sctp-v0.txt (Work In Progress), IETF, September 1999
IETF RFC 791	Internet Protocol
IETF RFC 768	User Datagram Protocol
IETF RFC 1483	Multi Protocol Encapsulation over ATM Adaptation Layer 5
IETF RFC 2225	Classical IP and ARP over ATM
IETF RFC 2460	"Internet Protocol, Version 6 (IPv6) Specification."
ITU-T I.361	B-ISDN ATM layer specification.
ITU-T I.363.2	B-ISDN ATM Adaptation Layer Type 2
ITU-T I.363.5	B-ISDN ATM Adaptation Layer Type 5
ITU-T Q.711	Functional description of the Signaling connection control part
ITU-T Q.712	Definition and function of Signaling connection control part messages
ITU-T Q.713	Signaling connection control part formats and codes
ITU-T Q.714	Signaling connection control part procedures
ITU-T Q.715	Signaling connection control part user guide
ITU-T Q.716	Signaling Connection Control Part (SCCP) performance
ITU-T Q.2100	B-ISDN Signaling ATM Adaptation Layer (SAAL) - overview description.
ITU-T Q.2110	B-ISDN ATM Adaptation Layer - Service Specific Connection Oriented Protocol (SSCOP).
ITU-T Q.2130	B-ISDN Signaling ATM Adaptation Layer - Service Specific Coordination Function for Support of Signaling at the User Network Interface (SSCF at UNI)
ITU-T Q.2140	B-ISDN ATM adaptation layer - Service Specific Co-ordination Function for Signaling at the Network Node Interface (SSCF AT NNI).
ITU-T Q.2150.1	AAL type 2 Signaling Transport Converter on Broadband MTP
ITU-T Q.2150.2	AAL Type 2 Signaling Transport Converter on SSCOP (Draft)
ITU-T Q.2210	Message transfer part level 3 functions and messages using the services of ITU-T Recommendation Q.2140.
ITU-T Q.2630.1	AAL type 2 Signaling Protocol (Capability Set 1)