UNIVERSITY OF TWENTE
The *SimpleWeb*

WEB SERVICES FOR MANAGEMENT
HOW IS PERFORMANCE?

PRESENTATION
AT THE 17th *IRTF-NMRG* MEETING
DAVIS, CALIFORNIA, USA
NOVEMBER 14, 2004

BASED ON THE PAPER: "*COMPARING THE PERFORMANCE OF SNMP AND WEB SERVICES BASED MANAGEMENT*",
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OVERVIEW

BACKGROUND

SNMP BANDWIDTH

WEB SERVICES BANDWIDTH

CPU TIME

MEMORY USAGE

ROUND-TRIP DELAY

CONCLUSIONS

BACKGROUND

WEB SERVICES FOR MANAGEMENT WAS FIRST DISCUSSED
AT THE 11th MEETING OF THE IRTF NMRG
(Osnabrück, September 2002)

PERFORMANCE WAS IDENTIFIED AS A POTENTIAL PROBLEM

INITIAL FIGURES THAT COMPARED THE PERFORMANCE OF
WEB SERVICES TO SNMP WERE PRESENTED AT THE 14th NMRG MEETING
(Heidelberg, October 2003)

ADDITIONAL FIGURES WERE PRESENTED BY:
PAVLOU: 15th NMRG MEETING (Bremen, January 2004)
CHOI: 16th NMRG MEETING (Seoul, April 2004)
NEISSE / GRANVILLE: NOMS (Seoul, April 2004)

SNMP BANDWIDTH - 1

$$L_{\mathrm{GET}} \approx \ 54 + n \cdot (10 + 2xOID_{\mathrm{length}} + S_{\mathrm{ObjectValue}})$$

$$L_{BULK} \approx \ 59 + 5n + n \cdot S_{\mathrm{ObjectValue}} + (\mathrm{n} + 1) \cdot OID_{\mathrm{length}}$$

n: NUMBER OF VARBINDS

OID_{length}: NUMBER OF LEVELS IN THE OID TREE

$S_{\mathrm{ObjectValue}}$: SIZE OF THE ENCODED DATA

SNMP BANDWIDTH - 2

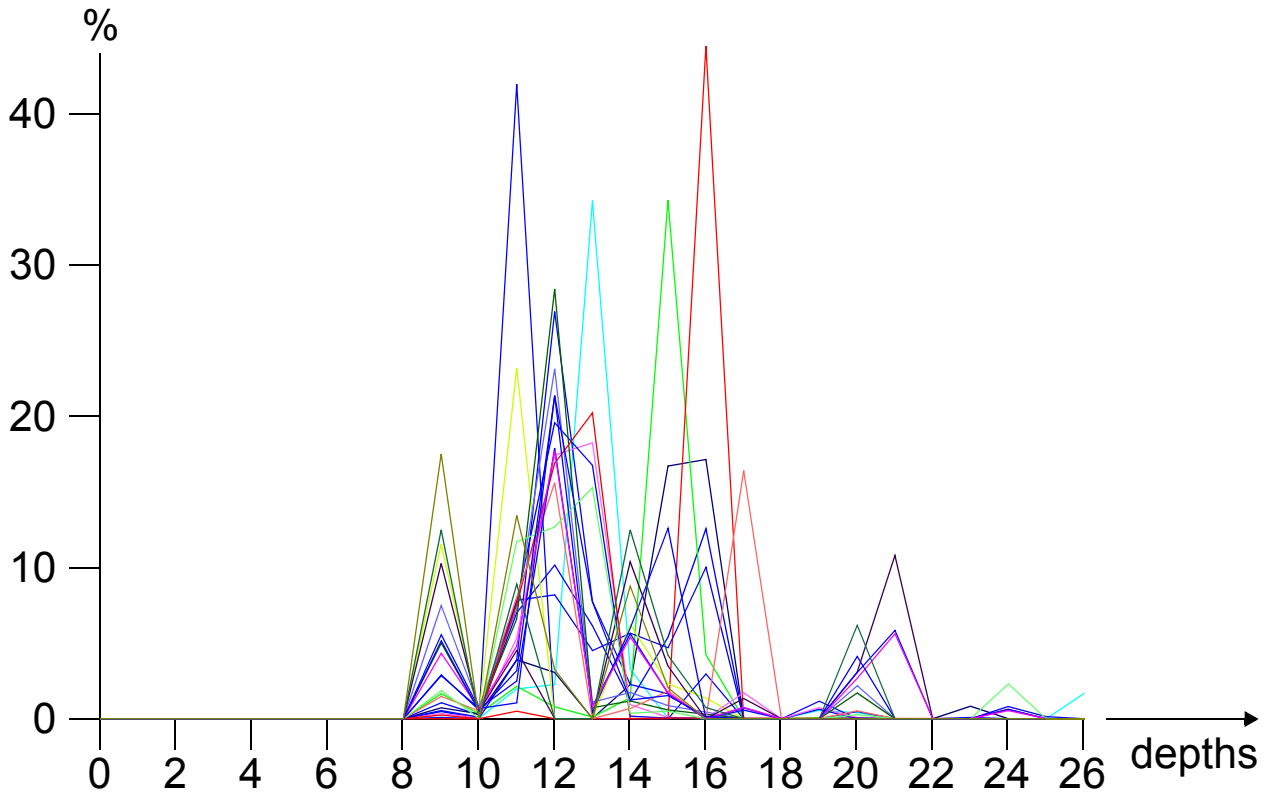
WHAT ARE REALISTIC VALUES FOR OID_{length} AND $S_{\text{ObjectValue}}$?

TO DETERMINE THIS, MIB-WALKS OVER MANY AGENTS

- 3Com: SuperStack II
- Cisco: AGS+, 3750, 6500, 6502, 7200
- HP: 2626, 4000
- IBM: 8371
- Nortel Baystack 450, Passport 8610
- UCD/Net-SNMP: 4.2.3, 5.0.1, 5.0.9, 5.1 (Debian, Windows XP)
- Microsoft Windows XP agent
- NuDesign agent
- SNMP Research CIA agent
- Cabletron Systems: ssr2000
- Xircom (GemTek)

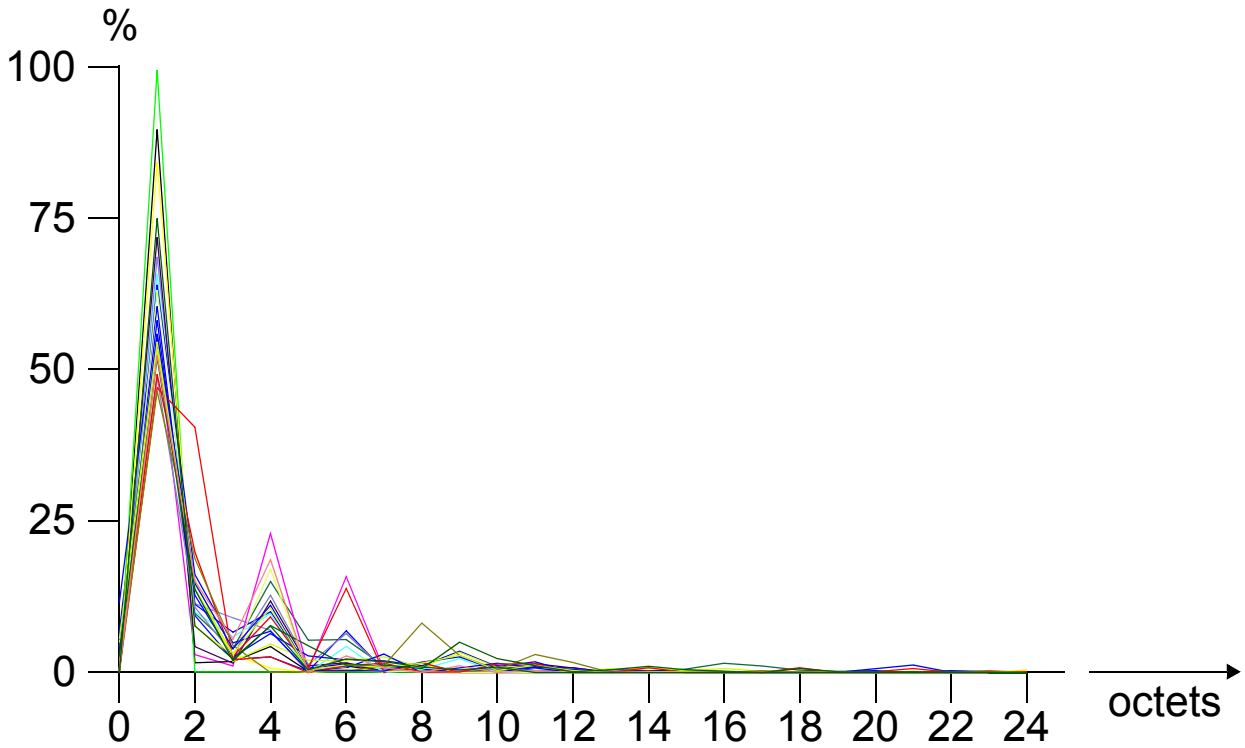
SNMP BANDWIDTH - 3

OID_{length} (MEASURED)



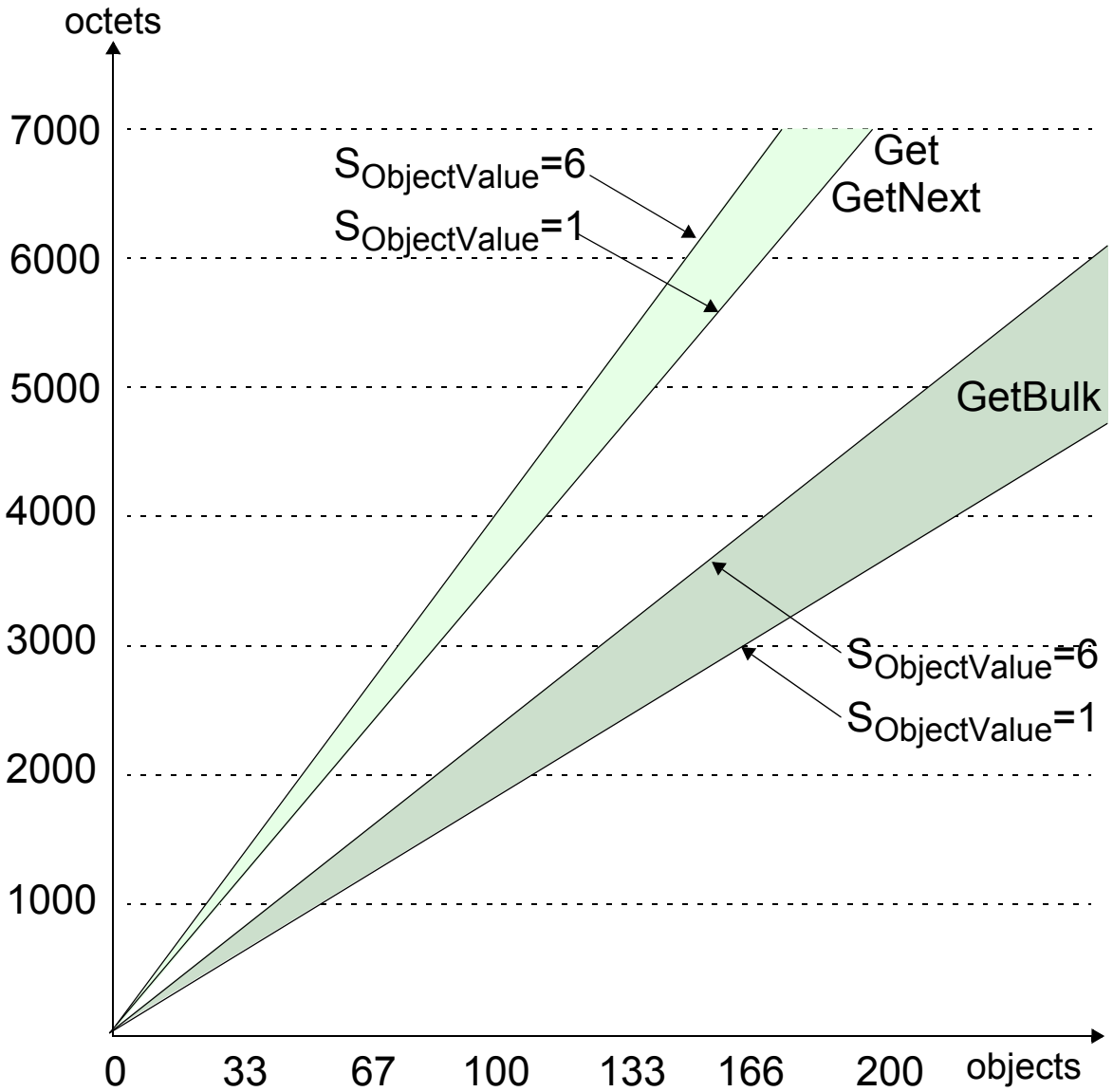
SNMP BANDWIDTH - 4

$S_{\text{ObjectValue}}$ (MEASURED)

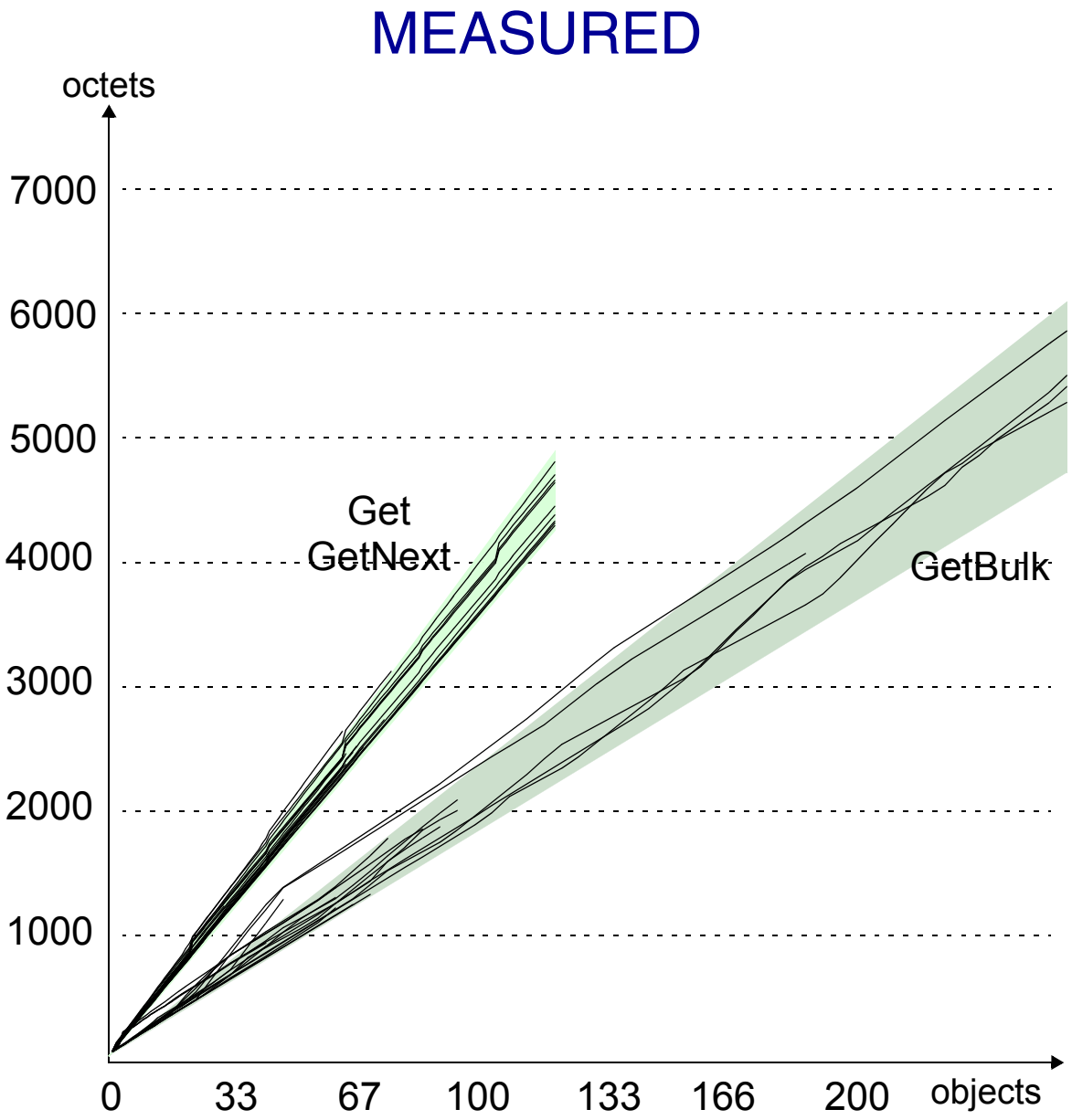


SNMP BANDWIDTH - 5

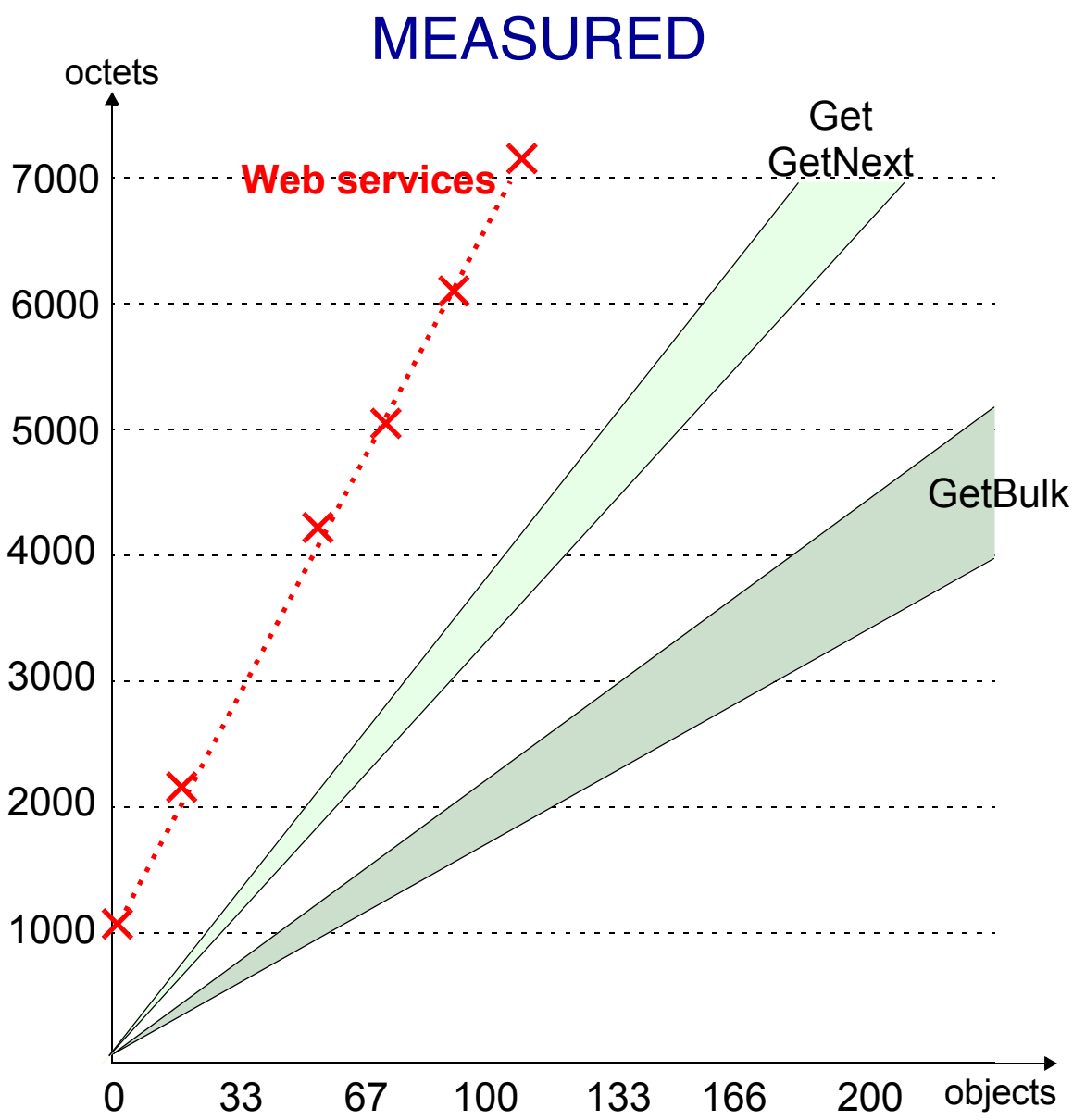
THEORY



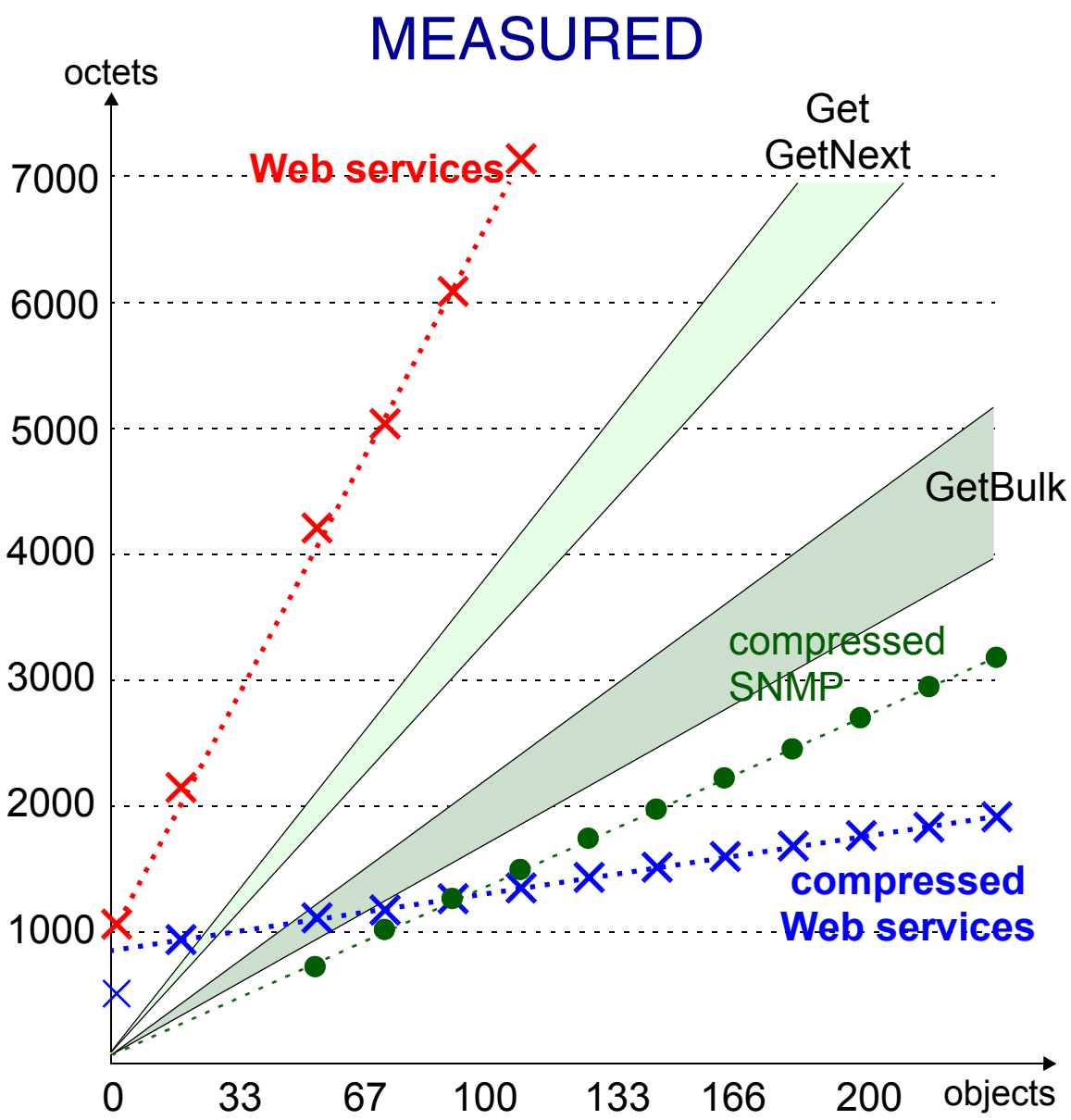
SNMP BANDWIDTH - 6



WEB SERVICES BANDWIDTH - 1



WEB SERVICES BANDWIDTH - 2



WEB SERVICES BANDWIDTH - 3

```
<?xml version="1.0" encoding="UTF-8"?>
<SOAP-ENV:Envelope
   xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
   xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xmlns:xsd="http://www.w3.org/2001/XMLSchema"
   xmlns:utMon="urn:UTMON">
<SOAP-ENV:Body SOAP-ENV:encodingStyle=
   "http://schemas.xmlsoap.org/soap/encoding/" id="_0">
   <utMon:GetIfTable>
      <community xsi:type="xsd:string">public</commuity>
   </utMon:GetIfTable>
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

REQUEST

```
<?xml version="1.0" encoding="UTF-8"?>
<SOAP-ENV:Envelope
   xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
   xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xmlns:xsd="http://www.w3.org/2001/XMLSchema"
   xmlns:utMon="urn:UTMON">
<SOAP-ENV:Body SOAP-ENV:encodingStyle=
   "http://schemas.xmlsoap.org/soap/encoding/" id="_0">
   ifEntry
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

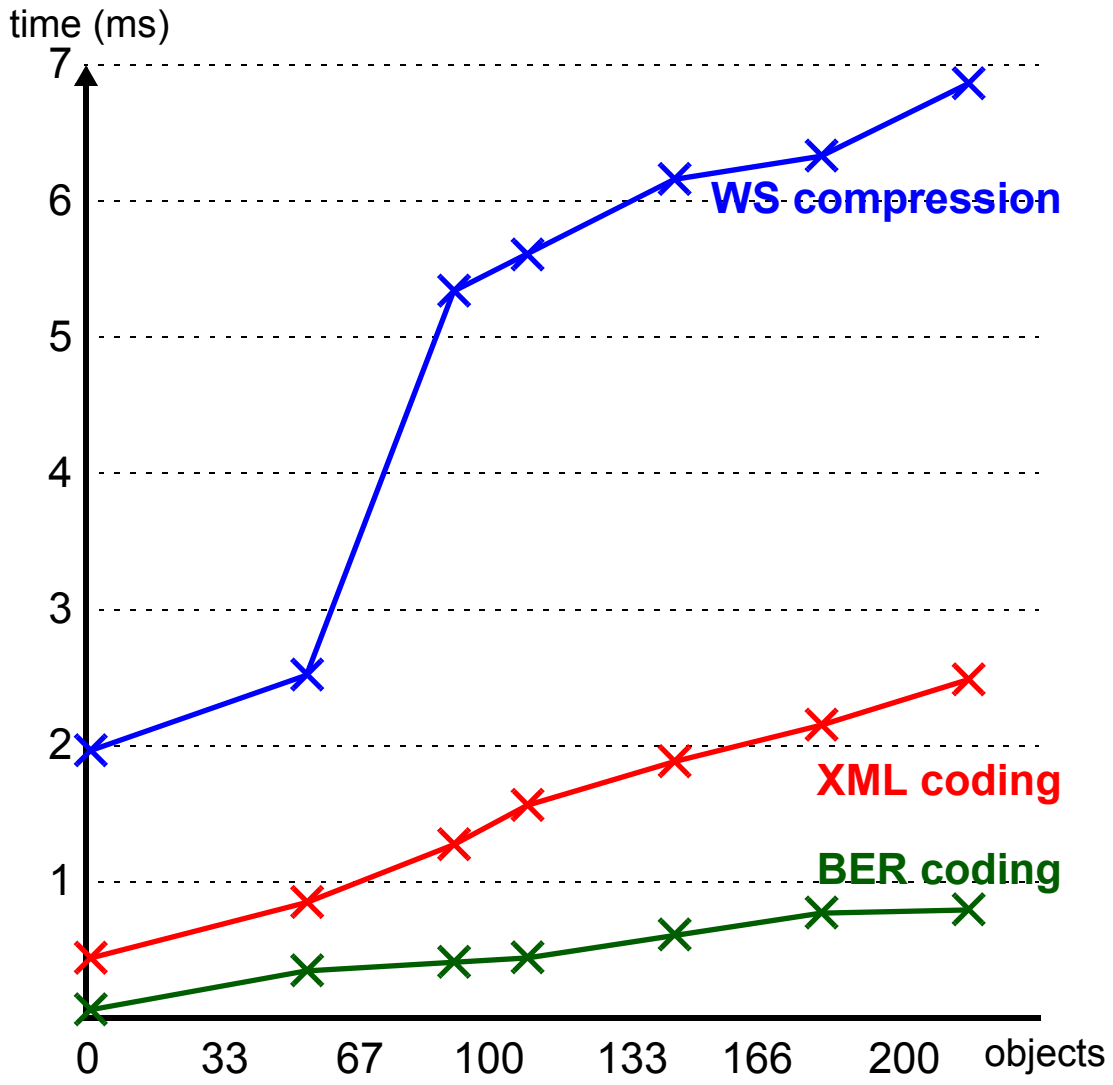
RESPONSE

WEB SERVICES BANDWIDTH - 4

RESPONSE
continued

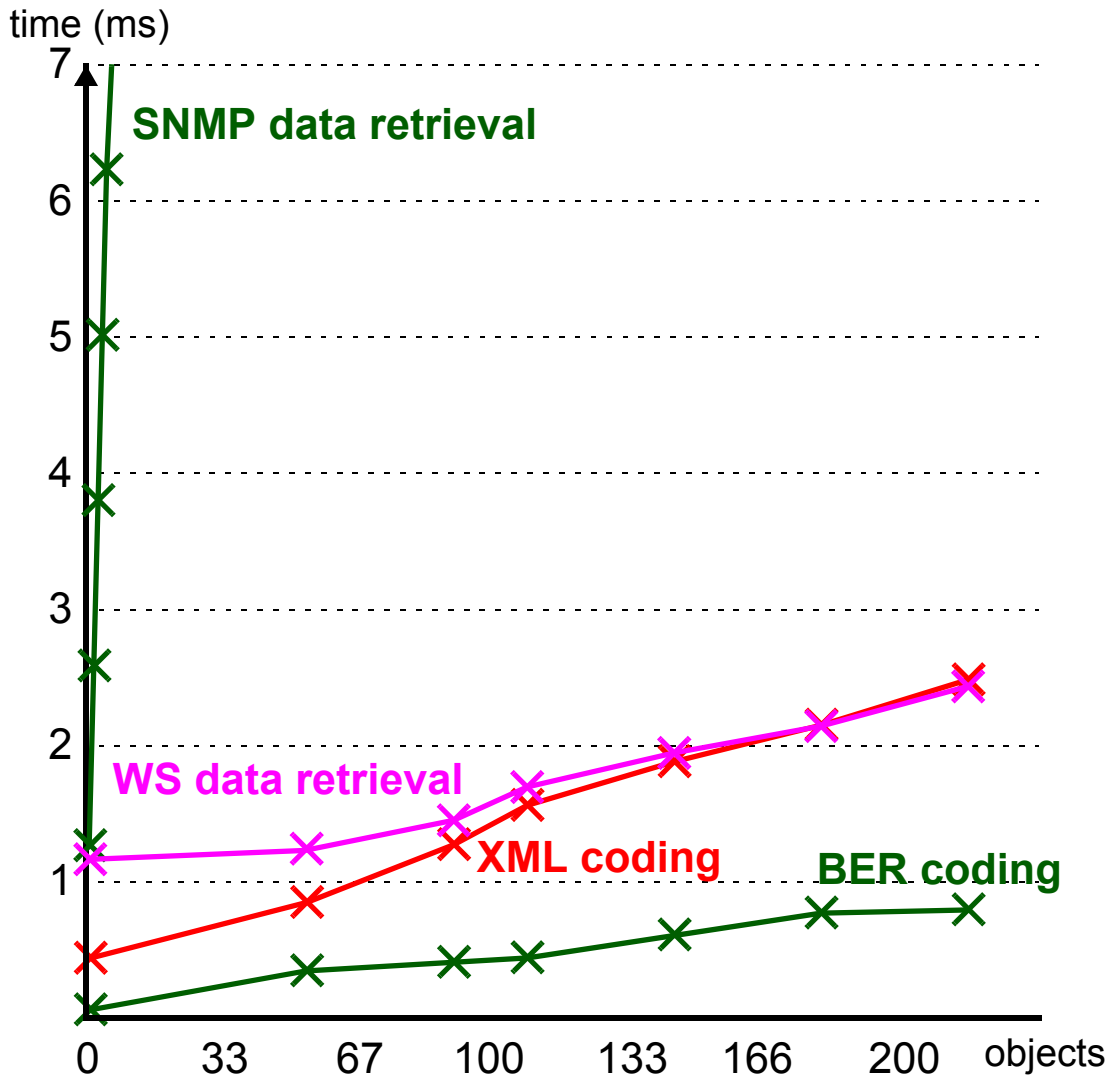

```
<ifEntry>
  <ifIndex xsi:type="xsd:unsignedInt">2</ifIndex>
  <ifDescr xsi:type="xsd:string">eth0</ifDescr>
  <ifType xsi:type="xsd:unsignedInt">6</ifType>
  <ifMtu xsi:type="xsd:unsignedInt">1500</ifMtu>
  <ifSpeed xsi:type="xsd:unsignedInt">10000000</ifSpeed>
  <ifPhysAddress xsi:type="xsd:string"> 0|40|63|C9|71|18</ifPhysAddress>
  <ifAdminStatus xsi:type="xsd:unsignedInt">1</ifAdminStatus>
  <ifOperStatus xsi:type="xsd:unsignedInt">1</ifOperStatus>
  <ifInOctets xsi:type="xsd:unsignedInt">354210076</ifInOctets>
  <ifInUcastPkts xsi:type="xsd:unsignedInt">1399059</ifInUcastPkts>
  <ifInDiscards xsi:type="xsd:unsignedInt">0</ifInDiscards>
  <ifInErrors xsi:type="xsd:unsignedInt">0</ifInErrors>
  <ifOutOctets xsi:type="xsd:unsignedInt">434349174</ifOutOctets>
  <ifOutUcastPkts xsi:type="xsd:unsignedInt">1508987</ifOutUcastPkts>
  <ifOutDiscards xsi:type="xsd:unsignedInt">0</ifOutDiscards>
  <ifOutErrors xsi:type="xsd:unsignedInt">1</ifOutErrors>
  <ifOutQLen xsi:type="xsd:unsignedInt">0</ifOutQLen>
  <ifSpecific xsi:type="xsd:string">0:0</ifSpecific>
</ifEntry>
```

CPU TIME - 1



zlib / gSOAP (V2.3.8) / Net-SNMP (5.0.9)

CPU TIME - 2



zlib / gSOAP (V2.3.8) / Net-SNMP (5.0.9)

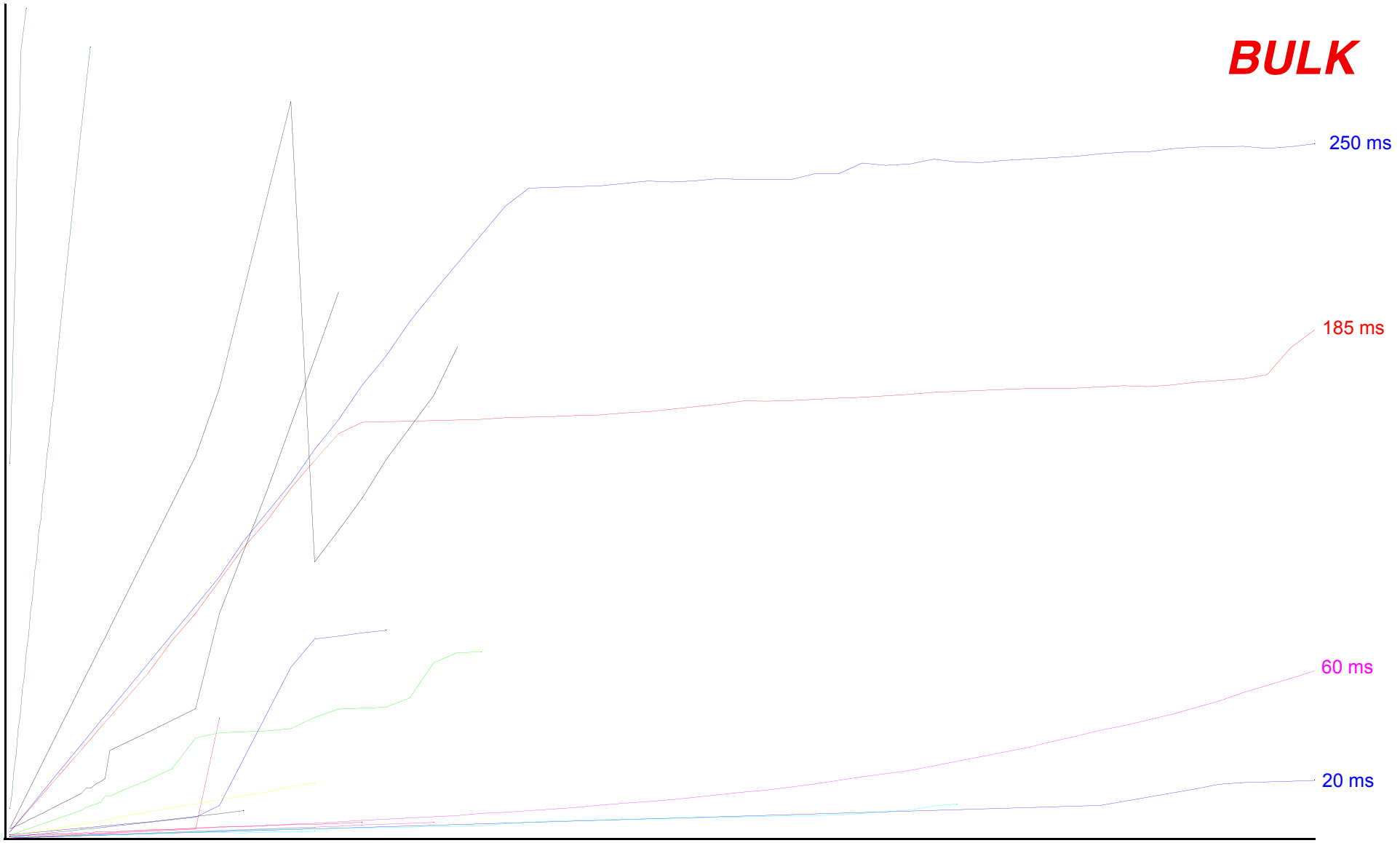
MEMORY USAGE

	instructions	data	
		static	dynamic
SNMP	1972 KB	128 KB	70 - 160 KB
Web services	580 KB	470 B	4 KB

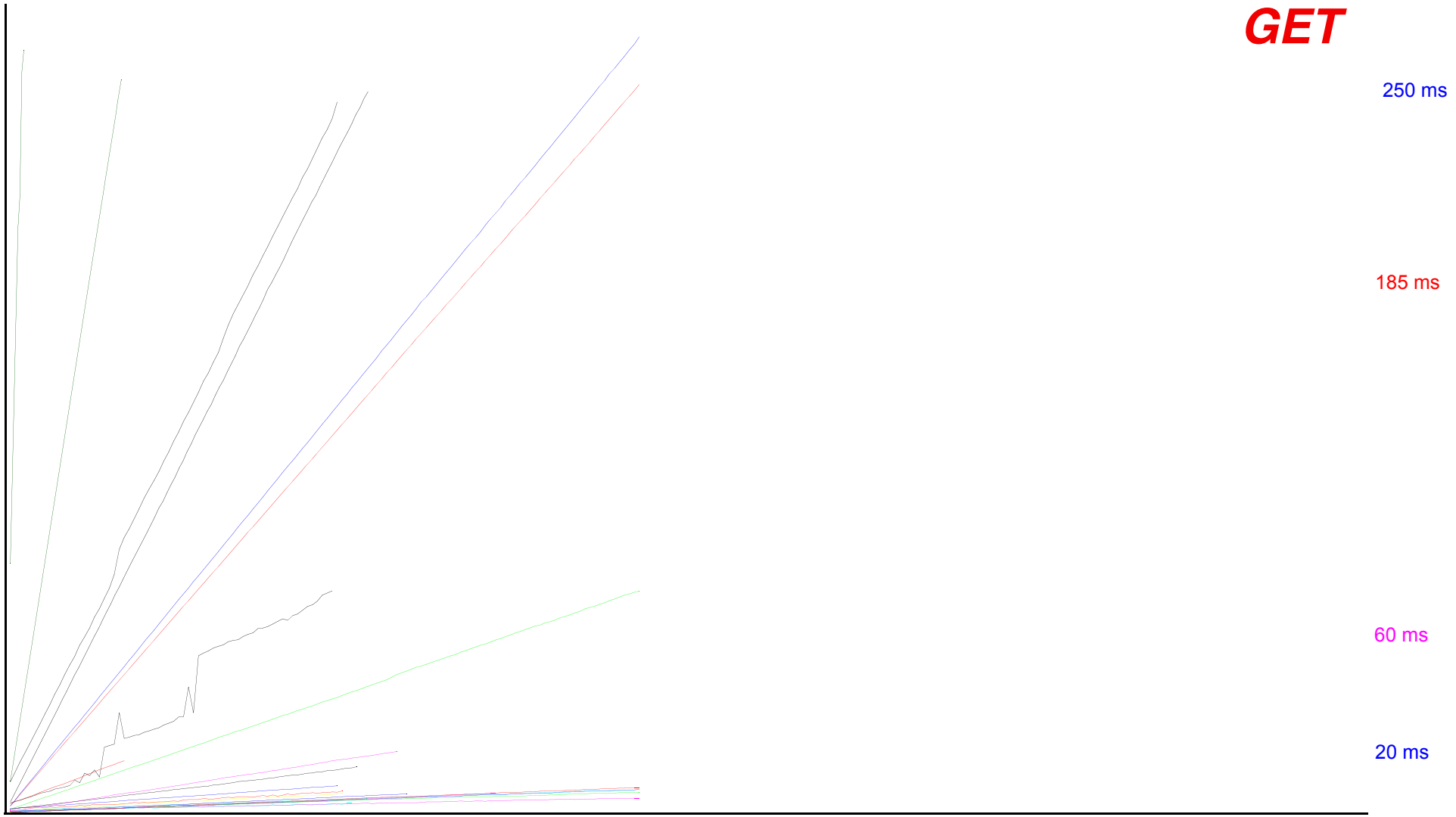
ROUND-TRIP DELAY - 1

	1	22	66	270
WS	1,7	2,6	10,3	36,5
WS-Comp	3,3	4,3	5,6	11,8
SNMP-1	0,4	1,6	3,9	21,1
SNMP-2	0,4	1,9	5,0	
SNMP-3	0,5	1,6	4,2	
SNMP-4	0,5	1,7	4,4	
SNMP-5	0,5	1,8	4,8	
SNMP-6	0,7	2,2	5,7	
SNMP-7	0,8	1,8	2,9	
SNMP-8	0,9	1,6	3,9	
SNMP-9	0,9	6,6	18,5	
SNMP-10	1,1	1,8	3,4	58,5
SNMP-11	1,2	2,9	6,7	
SNMP-12	1,3	2,7	5,4	
SNMP-13	1,5	14,0	40,1	
SNMP-14	1,6	5,0	15,1	
SNMP-15	1,7	4,2	9,6	
SNMP-16	2,7	44,5	127,6	178,7
SNMP-17	2,7	47	140,4	251,7
SNMP-18	3,5	17,2		
SNMP-19	3,7	24,3	77,9	
SNMP-20	4,1	76,7	100,8	
SNMP-21	11,1	83,7	243,0	
SNMP-22	11,3	238,7	727,6	
SNMP-23	87,7	1822,2		

ROUND-TRIP DELAY (SNMP) - 2



ROUND-TRIP DELAY (SNMP) - 3



CONCLUSIONS

SNMP IS BETTER
FOR A SMALL NUMBER OF OBJECTS

(COMPRESSED) WEB SERVICES IS BETTER
FOR A LARGE NUMBER OF OBJECTS

XML VERSUS BER MAY NOT BE THE MAIN ISSUE

DATA RETRIEVAL IS FREQUENTLY PROBLEMATIC

DIFFERENT SNMP AGENTS PERFORM QUITE DIFFERENTLY