

Grandstream Networks, Inc.

Advice Of Charge Guide





Table of Content

4
5
6
6
6
6
7
7
8
9
9
10
10
10





Table of figures

igure 1: SIP INFO containing AoC information during the call	7
igure 2: SIP BYE containing AoC information at the end of the call	8
igure 3: SIP 200 OK containing AoC information at the end of the call	9
igure 4: AoC-D displayed during a call on GXP1628	9
igure 5: AoC-E displayed at the end of a call on GXP1628	9
igure 6: AoC-D displayed during a call on GXP2135	10
igure 7: AoC-E displayed at the end of a call on GXP2135	10
igure 8: AoC-D displayed during a call on GRP2615	10
igure 9: AoC-E displayed at the end of a call on GRP2615	10
igure 10: AoC-D displayed during a call on GRP2603	10
igure 11: AoC-E displayed at the end of a call on GRP2603	10





SUPPORTED DEVICES

Model	Supported	Active by default	Firmware
GXP16xx	Yes	Yes	1.0.3.28 or higher
GXP17xx	Yes	Yes	1.0.0.37 or higher
GXP21xx	Yes	Yes	1.0.7.25 or higher
GRP260x	Yes	Yes	1.0.3.18 or higher
GRP261x/GRP2624/GR P2634	Yes	Yes	1.0.5.48 or higher

Following table shows Grandstream products supporting Advice of Charge feature:





INTRODUCTION

Advice of Charge service provides users with a way of tracking the actual cost of a specific call either prior or after calls are made.

Invocation of the Advice of Charge service is performed by the originating node; thus, this feature should be enabled from the service provider or SIP server side. Once AoC is invoked, the originating node receives charging information using supplementary service data structures.

This guide describes types of AoC how to use the Advice of Charge (AoC) service, and some screenshots showing the AoC information received during and at the end of calls.





ADVICE OF CHARGE TYPES

Two AoC types are available, each type determines AoC information to be returned at a different point in the call:

- AoC during the call (AoC-D): AoC-D provides the user with information about cost of the call during the call. For example, a subtotal of the cost could be sent to the user on an interval basis.
- AoC at the end of the call (AoC-E): AoC-E provides the user side with the total cost of the call at the time the call is ended (or later).

EXAMPLES OF CHARGING RATE VALUES

Based on the charging mechanism, users may or may not receive AoC information. Charging information might be displayed at different times during a call on the originating node phone's screen.

The most popular AoC values are:

- Basic communication details (Call duration, Current call charge, Final call charge ...).
- Price per time unit.
- Flat rate.

Users may request to their service providers some supplementary service operations or a user-to-user information transfer which include the following charge rate values:

- Price per time unit and time unit.
- Flat rate (a fixed currency value per event).
- Special charging code.
- Price per volume unit and volume unit.

AOC USE CASE

AoC information should be included in SIP messages respecting XML format. Call originating GXP phones will fetch data received and display it on the LCD screen.

AoC Information During the Call (AoC-D)

During an active call, service provider or SIP server (with AoC-D service enabled) may send charging information embedded in periodic **SIP INFO** messages including current consumption or other charging data.





Please refer to the following Wireshark capture showing AoC-D information in SIP INFO message:

	2 (v1.12.2-0-g898fa22 from ma	(Stel-1.12)]		-					
le <u>E</u> dit <u>V</u> iew <u>G</u> o <u>C</u> apture <u>A</u>	nalyze <u>S</u> tatistics Telephony	Tools Internals Help							
0 💉 🔳 🔏 📄 🗙 🔮	! 0, 🗢 🔿 주 👱 🗉	I 🗐 🔍 Q 🔍 🖭	M 🗹 🐔	₩ Ϊ					
Filter: sip		Expression	Clear	Apply	Save				
•		•							
Time	Source	Destination	Protocol	Length	Info				
2 15:13:56.661078000	192.168.6.241	192.168.6.220	SIP			SUBSCRIBE sip:35@19	2.168.6.220		
3 15:13:56.664150000	192.168.6.220	192.168.6.241	SIP			401 Unauthorized			
4 15:13:56.666279000	199.19.193.9	192.168.6.223	SIP			ACK sip:9352@192.16			
6 15:13:56.673501000	192.168.6.241	192.168.6.220	SIP			SUBSCRIBE sip:35@19			
7 15:13:56.677053000	199.19.193.9	192.168.6.226				INFO sip:9351@192.1	.68.6.226:5060	I	
3 15:13:56.685314000	192.168.6.220	192.168.6.241	SIP			404 Not Found			
0 15:13:56.692525000	192.168.6.241	192.168.6.220	SIP			SUBSCRIBE sip:37@19 200 OK	2.108.0.220		
1 15:13:56.694619000	192.168.6.226 192.168.6.220	199.19.193.9 192.168.6.241	SIP SIP			401 Unauthorized			
2 15:13:56.695434000	192.108.0.220	192.108.0.241	SIP	239	Status:	401 Unauthor ized	0 100 C 000 L		
	III								
cicrice 11, sic. drands									
iternet Protocol Versio				8.6.226	(192.16	8.6.226)			
er Datagram Protocol,		DST Port: 5060 (500	60)						
ession Initiation Proto									
Request-Line: INEO sin	9351@192.168.6.226:506	0 SIP/2.0							
Request Ernet Into Stp.									
Message Header									
Message Header Message Body									
Message Header Message Body = eXtensible Markup Lar	guage								
Message Header Message Body ⊡ eXtensible Markup Lar ⊡ xml</td <td>guage</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	guage								
Message Header Message Rody ⊡ eXtensible Markup Lar ⊡ xml<br version="1.0"	guage								
Message Header <u>Message Rody</u> □ eXtensible Markup Lar □ xml<br version="1.0" encoding="UTF-8"	guage								
Message Header Message Rody eXtensible Markup Lar <pre>> </pre> <pre></pre>	guage		1						
Message Header Message Rody eXtensible Markup Lar <pre>> <?xml version="1.0" encoding="UTF-8" ?> <pre>> ></pre></pre>		-1 (-i (1						
Message Header Message Rody extensible Markup Lar <pre>> <?xml version="1.0" encoding="UTF-8" ?> <pre>> <aoc xmlns="http://uri</aoc </pre></pre>	guage .etsi.org/ngn/params/xm	1/simservs/aoc">							
Message Header Message Rody extensible Markup Lar <pre>> </pre> <pre> coding="UTF-8"</pre>		1/simservs/aoc">							
Message Header Message Rody extensible Markup Lar extension="1.0" encoding="UTF-8" ?> extension="http://uri		1/simservs/aoc">	1						
Message Header Message Rody extensible Markup Lar <pre>> </pre> <pre></pre>	.etsi.org/ngn/params/xm	1/simservs/aoc">							
Message Header Message Rody eXtensible Markup Lar <pre>c?xml version="1.0" encoding="UTF-8" ?> caoc xmlns="http://uri <pre>caoc-d> ccharging-info> subtotal </pre></pre>	.etsi.org/ngn/params/xm o>	l]/simservs/aoc">							
Message Header Message Rody eXtensible Markup Lar <pre>version="1.0" encoding="UTF-8" ?> <aoc xmlns="http://uri <aoc-d> <pre>charging-info> subtotal </pre></aoc-d></aoc </pre>	.etsi.org/ngn/params/xm To> 25>	1/simservs/aoc">							
Message Header Message Rody eXtensible Markup Lar extensible Markup Lar ecoding="UTF-8" ?> acoc xmlns="http://uri <acc-d> charging-info> subtotal <u>subtotal</u> <u>crecorded-chargi</u> <u>crecorded-curr</u></acc-d>	.etsi.org/ngn/params/xm ^{'0>} 25> <u>'ency-units></u>	1/simservs/aoc">							
Message Header Message Rody eXtensible Markup Lar <pre>extensible markup Lar ecoding="UTF-8" ?> acoc xmlns="http://uri <acoc-d> <accdr subtral<br=""> subtotal <recorded-chargi <accdr subtral<br=""><td>.etsi.org/ngn/params/xm ^{'0>} 25> <u>'ency-units></u></td><td>ll/simservs/aoc"></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></accdr></recorded-chargi </accdr></acoc-d></pre>	.etsi.org/ngn/params/xm ^{'0>} 25> <u>'ency-units></u>	ll/simservs/aoc">							
Message Header Message Rody eXtensible Markup Lar <pre>extensible Markup Lar extension="1.0" encoding="UTF-8" ?> acoc xmlns="http://uri caoc-d> charging-info> subtotal subtotal subtotal subtotal EUR</pre>	.etsi.org/ngn/params/xm ^T o> 25> <u>rency-units></u> >	l]/simservs/aoc">							
Message Header Message Rody eXtensible Markup Lar <pre>extensible Markup Lar ercoding="UTF-8" ? <pre>caoc xmlns="http://uri <aoc-d> <pre>charging-info> subtotal <recorded-charg <recorded-charg <recorded-curr <pre>currency-id EUR </pre></recorded-curr </recorded-charg </recorded-charg </pre></aoc-d></pre></pre>	.etsi.org/ngn/params/xm ^{To>} 25> <u>ency-units></u> > -id>	l∕simservs/aoc">							
Message Header Message Rody eXtensible Markup Lar <pre>extensible Markup Lar ecoding="UTF-8" ?> acc xmlns="http://uri <cacc-d> <pre>ecorded-charging-info> subtotal subtotal subtotal EUR </pre></cacc-d></pre>	.etsi.org/ngn/params/xm ^{To>} 25> <u>ency-units></u> > -id>	1/simservs/aoc">							
Message Header Message Rody extensible Markup Lar <pre>extensible Markup Lar <pre>extensible Markup Lar <pre>extension="1.0" encoding="UTF-8" ?> <pre>caoc xmlns="http://uri <pre>caoc</pre> <pre>caoc</pre> <pre>ckarging-info> subtotal </pre> <pre>crecorded-charg <pre>crecorded-charg <pre>crecorded-charg <pre>crecorded-curr <pre>EUR </pre> <pre>c/currency-id <pre>EUR </pre> <pre>currency-an 0.0</pre></pre></pre></pre></pre></pre></pre></pre></pre></pre>	.etsi.org/ngn/params/xm 	ll/simservs/aoc">							
Message Header Message Rody extensible Markup Lar <pre>extensible Markup Lar <pre>extensible Markup Lar <pre>extension="1.0" encoding="UTF-8" ?> <pre>extension="1.0" encoding="UTF-8" ?> <pre>extension="1.0" encoding="UTF-8" ?> <pre>extension="1.0" encoding="UTF-8" ?> <pre>extension="1.0" encoding="UTF-8" ?> <pre>extension="1.0" encoding="UTF-8" ?> <pre>extension="1.0" encoding="UTF-8" ?> <pre>extension="1.0" encoding="UTF-8" ?> <pre>extension="1.0" encoding="UTF-8" ?> <pre>extension="1.0" encoding="UTF-8" ?> <pre>extension="1.0" encoding="UTF-8" ?> <pre>extension="1.0" encoding="UTF-8" ?> <pre>extension="1.0" encoding="UTF-8" ?> <pre>extension="1.0" encoding="UTF-8" ?> <pre>extension="1.0" encoding="UTF-8" ?> <pre>extension="1.0" encoding="UTF-8" encoding="UTF</pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre>	.etsi.org/ngn/params/xm io> is> iency-units> - -id> ount> -amount>	ll/simservs/aoc">							
Message Header Message Rody extensible Markup Lar extensible Markup Lar ercoing="UTF-8" ?> <aoc xmlns="http://uri <aoc-d> <charging-info> subtotal </charging-info> subtotal ccorded-chargi <currency-id EUR 0.0 <td>.etsi.org/ngn/params/xm io> 25> rency-units> -id> ount> -amount> urrency-units></td><td>1/simservs/aoc"></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></currency-id </aoc-d></aoc 	.etsi.org/ngn/params/xm io> 25> rency-units> -id> ount> -amount> urrency-units>	1/simservs/aoc">							
Message Header Message Rody extensible Markup Lar <pre> extensible Markup Lar extensible Markup Lar <pre> extension="1.0" encoding="UTF-8" ?> <pre> extension="1.0" encoding="UTF-8" ?> <pre> extension="1.0" encoding="UTF-8" ?> <pre> extension="1.0" encoding="UTF-8" ?> <pre> extension="1.0" encoding="UTF-8" ?> <pre> extension="1.0" encoding="UTF-8" ?> <pre> extension="1.0" encoding="UTF-8" ?> encoding="UTF-8" encoding="UT</pre></pre></pre></pre></pre></pre></pre></pre>	.etsi.org/ngn/params/xm io> 25> rency-units> -id> ount> -amount> urrency-units>	1/simservs/aoc">							
Message Header Message Rody extensible Markup Lar <pre> extensible Markup Lar ercoding="UTF-8" ?> acoc xmlns="http://uri acoc-d> <pre> charging-info> subtotal subtotal subtotal subtotal subtotal subtotal subtotal subtotal subtotal subtotal subtotal subtotal subtotal <td>.etsi.org/ngn/params/xm .etsi.org/ngn/params/xm .ency-units> .ency-units> .id> .id> .amount> urrency-units> urrency-units> urges></td><td>ll/simservs/aoc"></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pre></pre>	.etsi.org/ngn/params/xm .etsi.org/ngn/params/xm .ency-units> .ency-units> .id> .id> .amount> urrency-units> urrency-units> urges>	ll/simservs/aoc">							
Message Header Message Rody extensible Markup Lar <pre> extensible Markup Lar ercoding="UTF-8" ?> <pre> extensible Markup Lar ercoding="UTF-8" ?> <pre> extension="1.0" encoding="UTF-8" ?> <pre> extension="1.0" encoding="UTF-8" ?> <pre> extension="1.0" encoding="UTF-8" ?> <pre> extension="1.0" encoding="UTF-8" ?> <pre> extension="1.0" encoding="UTF-8" ?> <pre> extension="1.0" encoding="UTF-8" ?> extension="1.0" encoding="UTF-8" ?> encoding="UTF-8" encoding="UTF-8" encoding="1.0" encoding="UTF-8"</pre></pre></pre></pre></pre></pre></pre></pre>	.etsi.org/ngn/params/xm .etsi.org/ngn/params/xm .ency-units> .ency-units> .id> .id> .amount> urrency-units> urrency-units> urges>	l]/simservs/aoc">							
Message Header Message Rody eXtensible Markup Lar <pre> eXtensible Markup Lar <pre> extensible Markup Lar <pre> extensible Markup Lar <pre> extension="1.0" encoding="UTF-8" ?> <pre> caoc xmlns="http://uri <pre> caoc</pre> xmlns="http://uri <pre> caoc</pre> conded-charge <pre> currency-id EUR 0.0 conded-charge </pre></pre></pre></pre></pre></pre>	.etsi.org/ngn/params/xm .etsi.org/ngn/params/xm .ency-units> .ency-units> .id> .id> .amount> urrency-units> urrency-units> urges>	1/simservs/aoc">							

Figure 1: SIP INFO containing AoC information during the call

AoC Information at the End of the Call (AoC-E)

At the end of a call, service provider or SIP server (with AoC-E service enabled) may send charging information embedded in a **SIP BYE** or **200 OK** messages including summary of ended call (duration, costs, final charge and price per time).

AoC-E in SIP BYE message

When the phone originating the call is not the one ending the call, AoC-E information will be included in **SIP BYE** as shown in the following Wireshark capture:





AOC_E1.pcapng [Wireshark 1.12.2	(v1.12.2-0-g898fa22 from m	aster-1.12)]			x
<u>File Edit View Go</u> Capture Ana	lyze Statistics Telephony	Tools Internals Help			
0 0 💉 🔳 🔬 🕒 🗎 🗙 🤁 I	Q, 🗢 🔿 春 👱 🗍	III Q Q Q 🗉	🏽 🗹 🛃	🔆 🗒	
Filter: sip		Expression	Clear	Apply Save	
No. Time	Source	Destination		Length Info	-
1369 15:12:08.100931000 1784 15:12:10.110522000	192.168.6.220	192.168.6.241	SIP	389 Status: 404 Not Found 680 Request: SUBSCRIBE sip:34@192.168.6.220	
1787 15:12:10.118493000	192.168.6.220	192.168.6.241		541 Status: 401 Unauthorized	
1789 15:12:10.126077000	192.168.6.241	192.168.6.220	SIP	950 Request: SUBSCRIBE sip: 34@192.168.6.220	
1790 15:12:10.129589000	192.168.6.220	192.168.6.241	SIP	388 Status: 404 Not Found	
1793 15:12:10.136612000	192.168.6.241	192.168.6.220	SIP	679 Request: SUBSCRIBE sip:36@192.168.6.220	
1794 15:12:10.139516000	192.168.6.220	192.168.6.241	SIP	540 Status: 401 Unauthorized	
1797 15:12:10.147661000	192.168.6.241	192.168.6.220	SIP	950 Request: SUBSCRIBE sip:360192.168.6.220	
1799 15:12:10.151139000	192.168.6.220	192.168.6.241	SIP	389 Status: 404 Not Found	
1823 15:12:10.279314000	192.168.6.223	199.19.193.9	SIP	672 Request: BYE sip:199.19.193.9:5060;transport=udp	
1876 15:12:10.497465000	199.19.193.9	192.168.6.223		417 Status: 200 OK	
1877 15:12:10.502259000	199.19.193.9	192.168.6.226	SIP/XML	853 Request: BYE sip:9351@192.168.6.226:5060	Ŧ
•	III				P
■ Frame 1877: 853 bytes on w	vire (6824 bits) 853	hytes cantured (68)	24 hits)	on interface 0	
■ Ethernet II, Src: Grandstr					-
Internet Protocol Version					
User Datagram Protocol, Sr				······,	
Session Initiation Protoco					
■ Request-Line: BYE sip:93	51@192.168.6.226:5060	SIP/2.0			
🗉 Message Header					
Message Body					
eXtensible Markup Lange	uage				
version="1.0"					
encoding="UTF-8"					
?>					
□ <aoc< td=""><td> , , , ,</td><td>1/: / "</td><td></td><td></td><td></td></aoc<>	, , , ,	1/: / "			
	tsi.org/ngn/params/xm	11/simservs/aoc">			-
□ <aoc-e></aoc-e>					-
<recorded-charges< p=""></recorded-charges<>					
□ <recorded-currency-id></recorded-currency-id>	ncy-units>				
EUR					
<td>ds</td> <td></td> <td></td> <td></td> <td></td>	ds				
□ <currency-amou< td=""><td></td><td></td><td></td><td></td><td></td></currency-amou<>					
0.0					
<td>amount></td> <td></td> <td></td> <td></td> <td></td>	amount>				
<td></td> <td></td> <td></td> <td></td> <td></td>					
<td>ges></td> <td></td> <td></td> <td></td> <td></td>	ges>				
	-				
normal-charging					
					-
	1 (cro · ·)		•		

Figure 2: SIP BYE containing AoC information at the end of the call

AoC-E in SIP 200 OK message

When the phone originating the call is the one ending the call, AoC-E information will be included in SIP 200 OK message (response to BYE message). Please refer to the following Wireshark capture showing AoC-E information in SIP 200 OK message:





Gle Edit View Go Capture Analyze Statistics Telephony Iools Internals Help Image: Supersonal Content of Conten
<pre>o. Time Source Destination Protocol Length Info Sof 17.11.03.142535000 132.100.0.241 132.100.0.220 347 372 Kequest. 3050_KREE 51P.200432.100.0.220 1 S111:05.15635600 132.168.6.220 132.168.6.241 SIP 330 Status: 404 Not Found S37 15:11:05.163437000 192.168.6.220 192.168.6.220 SIP 683 Request: SUBSCRIBE sip:27@192.168.6.220 S37 15:11:05.163421000 192.168.6.220 192.168.6.220 SIP 683 Request: SUBSCRIBE sip:27@192.168.6.220 S37 15:11:05.16542000 192.168.6.241 192.168.6.220 SIP 683 Request: SUBSCRIBE sip:27@192.168.6.220 S37 15:11:05.16542000 192.168.6.241 192.168.6.220 SIP 683 Request: SUBSCRIBE sip:27@192.168.6.220 S39 15:11:05.16542000 192.168.6.241 SIP 392 Status: 404 Not Found S38 0 15:11:05.16512000 192.168.6.220 192.168.6.241 SIP 392 Status: 404 Not Found S38 0 15:11:05.611791000 192.168.6.226 199.19.193.9 SIP 658 Request: SUBSCRIBE sip:199.19.193.9;5060;transport=udp S38 0 15:11:05.821534000 199.19.3.9 192.168.6.226 SIP/XML 758 Status: 200 OK Frame 6008: 758 bytes on wire (6064 bits), 758 bytes captured (6064 bits) on interface 0 Ethernet II, Src: Grandstr_&b:4f:8b (00:0b:82:8b:4f:8b), Dst: Grandstr_&7:7b:ad (00:0b:82:87:7b:ad) Internet Protocol Version 4, Src: 199.19.193.9 (199.19.193.9), Dst: 192.168.6.226 (192.168.6.226) User Datagram Protocol, Src Port: 5060 (5060), Dst Port: 5060 (5060) Session Initiation Protocol (200) Status-Line: SIP/2.0 200 OK Message Header Message Readv extensible Markup Language extensible Markup Languag</pre>
ior 10:11:03:14:2333000 132:100:0.241 132:100:0.241 132:100:0.241 i11:51:105:15635600 192:168:6.221 192:168:6.221 192:168:6.221 192:168:6.220 i93:15:11:05:163437000 192:168:6.220 192:168:6.221 SIP 683 Request: SUBSCRIBE sip:27@192:168.6.220 i93:15:11:05:163437000 192:168:6.220 192:168:6.220 192:168:6.220 i93:15:11:05:18612400 192:168:6.220 192:168:6.220 192:168:6.220 i03:15:11:05:18612400 192:168:6.220 192:168:6.220 192:168:6.220 i03:15:11:05:196532000 192:168:6.226 192:168:6.226 192:168:6.226 i03:11:105:196532000 199:19:193:9 192:168:6.226 192:168:6.226 192:168:6.226 i03:11:105:196532000 199:19:193.9 192:168:6.226 SIP/XML 758 Status: 200 0K i10:11:05:12534000 199:19:193.9 192:168:6.226 SIP/XML 758 Status: 200 0K i21:11:05:23400 199:19:193.9 192:168:6.226 192:168:6.226 192:168:6.226 uses batagram Protocol, Src Port: 5060 (5060), Dst Port: 5060 (5060) Session Initiation Protocol (200) Status-Line: SIP/2.0 200 0K isextensible Markup Language ex2ml
<pre> <recorded-charges> </recorded-charges></pre> </td

Figure 3: SIP 200 OK containing AoC information at the end of the call

EXAMPLES OF AOC INFORMATION DISPLAYED

Following screenshots show how AoC-D and AoC-E information are displayed in each one of GXP and GXV models:

GXP16xx Series (GXP1628 as example)

Q	1	1.0 EUR 🔫	00:38
•••)	2	0622336688	
	E	ndCall	

Figure 4: AoC-D displayed during a call on GXP1628

C	Advice of Charge
-	2 Line 1: Total amount: 4.0 EU
-	EndCall

Figure 5: AoC-E displayed at the end of a call on GXP1628





GXP21xx Series (GXP2135 as example)

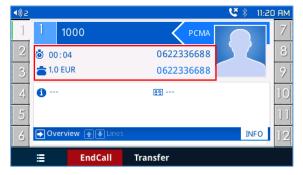


Figure 6: AoC-D displayed during a call on GXP2135

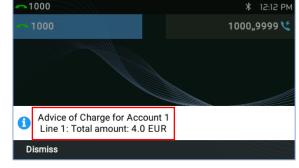
GRP261x Series (GRP2615 as example)

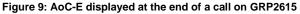


Figure 7: AoC-E displayed at the end of a call on GXP2135

▲ 0)TALKING | 1000 ※ 12:12 PM 00:00:06 1/1 ÷ 2000 2000 2000 2000 AOC 1.0 EUR INFO © OK EndCall ConfCall NewCall

Figure 8: AoC-D displayed during a call on GRP2615





GRP260x Series (GRP2603 as example)



Figure 10: AoC-D displayed during a call on GRP2603



Figure 11: AoC-E displayed at the end of a call on GRP2603

