WHITE PAPER

# Mobile Value-Added Services with Sangoma

SANGOMA

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# Introduction to Mobile VAS

Telephony service providers realized years ago that they could increase revenue and reduce customer churn by providing “enhanced” or “value-added” services to their subscribers. These services are all inclusive of anything that goes beyond the basics of call completion. They include both “functional services” like caller id, call forwarding and network based voice mail, as well as “informational” services like, wake-up calls, news services, weather check, medical and appointment reminders and many more.

## What is Mobile VAS

With the proliferation of mobile telephony and mobile data services, the opportunity to provide mobile VAS services has exploded. The tight integration of voice, text messaging, email and other data services has ignited an explosion of value-added services targeted directly at the mobile user.

## Market Opportunity

The mobile VAS market is expanding around the world. In India alone, there are over 900 million mobile subscribers[1]. This market alone is projected to reach $11 billion USD by 2015[2]. The world market is projected to reach $360 billion USD in that same time period[3].

[1] http://uk.reuters.com/article/2012/04/07/india-telecom-add-idUKL3E8F705420120407

[2] http://trak.in/tags/business/2011/04/12/indian-mobile-vas-market-to-reach-rs-55000-crore-by-2015-really/

[3] http://www.telecoms.com/21647/emerging-markets-driving-vas-growth/

# What is CRBT

Custom Ring Back Tone is one of the many value-added services that has seen incredible adoption in recent years. As the name states, the service allows customization of the ring back tone. When a call is placed, the caller hears an audible alert through the phone. The alert that indicates that a call is successfully going through is called the Ring Back Tone. Other tones that may also be heard at this stage of a call are an engaged or busy signal or an operator intercept tone.

In a traditional call, the ring back tone is some sort of ringing cadence. The ringing cadence is generated by the network and often varies from country to country.

CRBT is a service by which a CRBT subscriber (that is the person who is receiving the call), can customize the ring back tone, based on the phone number of the person who is placing the call.

This service can be implemented with any telecom network but it is mainly offered in wireless networks, where personalization services have been an important part of reducing churn and maintaining customer loyalty. Although this is just one example of the many mobile VAS services that can be delivered using this same architecture, the rest of this paper deals with the implementation of a CRBT service.

## What is the Opportunity

Some reports estimate that in certain markets CRBT represents 35% of the total Mobile VAS Market[†].

Based a worldwide estimate of a $360 billion dollar market, the opportunity for CRBT could be as much as $90 billion.

[†] http://www.pluggd.in/indian-telecom-industry/mobile-vas-numbers-india-revenue-category-split-2454/

# The Basics of CRBT

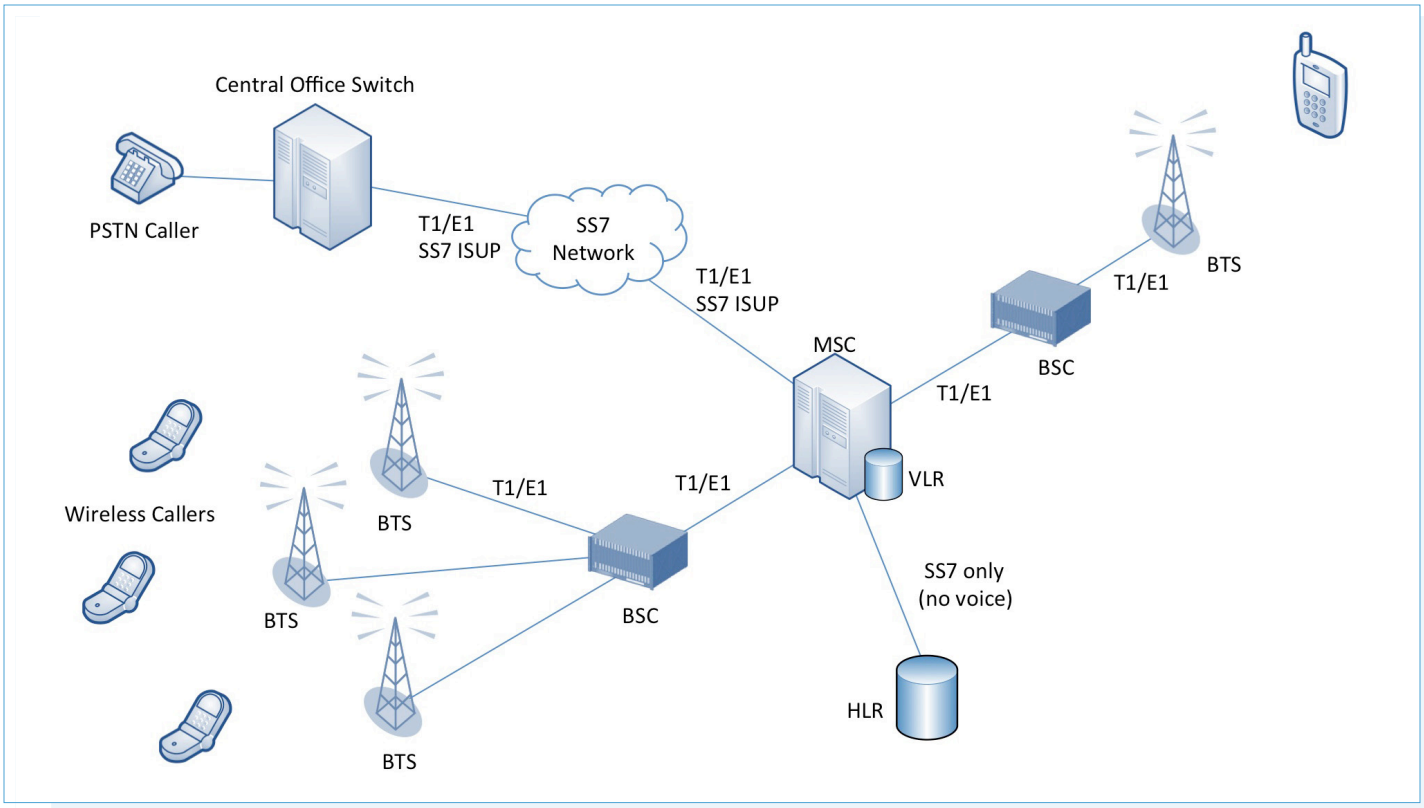


FIGURE 1: TYPICAL MOBILE NETWORK

| | |
|---|---|
| MSC: | Mobile Switching Center; Central Office of Mobile Carriers |
| BSC: | Base Station Controller; Cell Site concentrator, takes care of cell site handover while moving with Mobile Phone |
| BTS: | Base Transceiver Station; Cell Site; Antenna site |
| HLR: | Home Location Register; Subscriber db |
| VLR: | Visitor Location Register. Local subscriber db, gets loaded from HLR; it knows which BTS the mobile phone is in |

When implementing CRBT there are a number of steps that need to be enabled in order to make the application work properly. There must also be some way for the CRBT subscriber to upload ring back tones to the CRBT server and to map these ring back tones to the telephone numbers of the callers they want to hear these custom ring back tones.

# Adding the CRBT Server

In order to deliver the CRBT service a CRBT server must be part of the call path. *Figure 2* shows the CRBT server installed into the network. The CRBT server must be able to communicate with MSC via E1/T1 (or some other means over which media can be sent) and using SS7 ISUP (which is how the signaling information is communicated). In addition, the CRBT server must be able to "dip" the HLR in order to override certain settings in the HLR that make the service possible. See *Figure 3* for more details on the exact call flow.

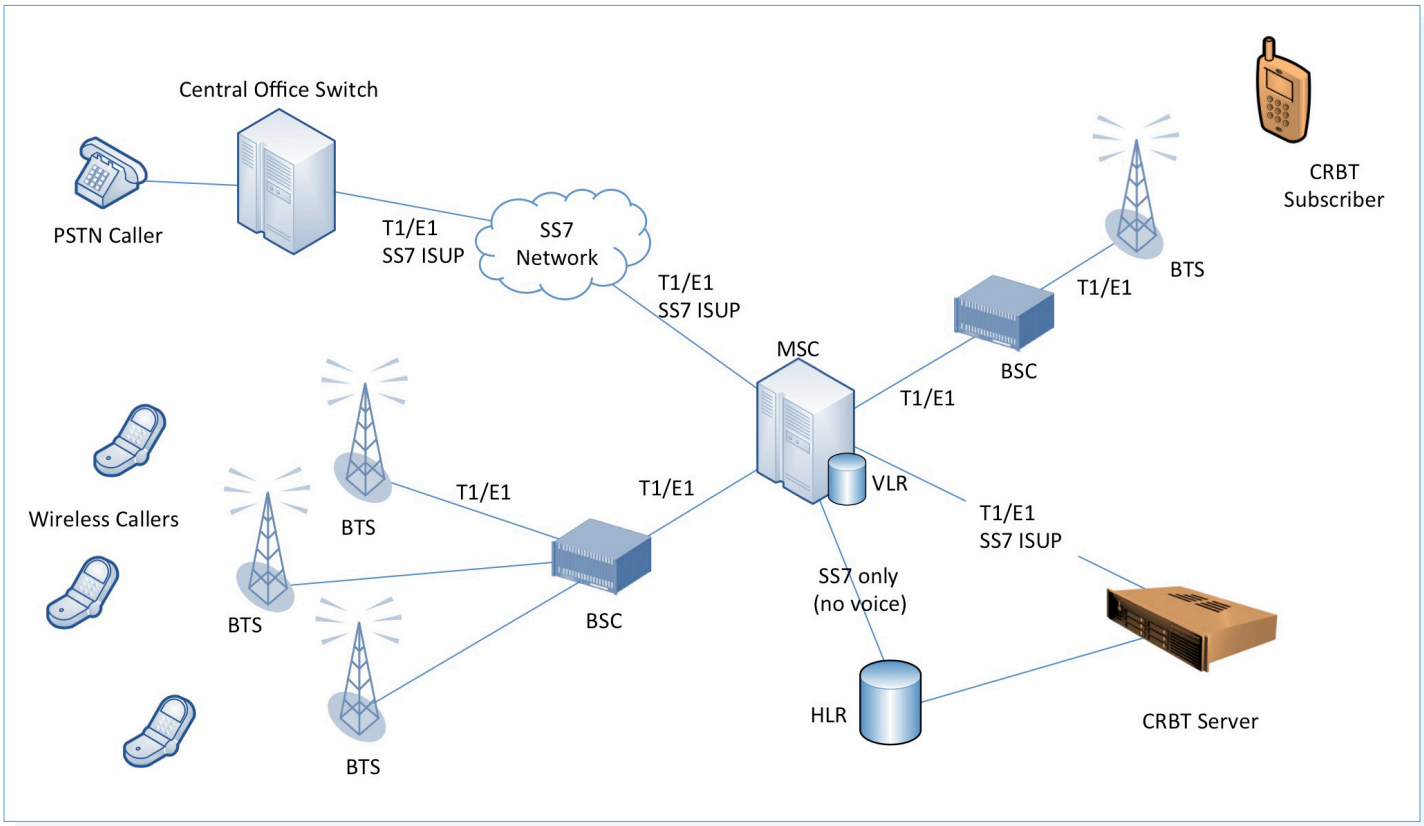


FIGURE 2: MOBILE NETWORK WITH CRBT SERVER

## STEP ONE: Intercept the Call to CRBT Subscriber Using SS7

Intercepting the call and routing it to the CRBT server can be broken into four steps:

1. CRBT subscriber is tagged CFNRC (call forward not reachable), in the HLR. The call forwarding number is pointed to the CRBT server. Although this is indicated in the drawing as step one, it is actually a setting on the subscribers account, prior to any inbound call being generated.
2. Someone places a call to the CRBT subscriber. Note in *Figure 3* that the inbound call, indicated as "2", can come either from the PSTN or a mobile phone. Remember that the CRBT can be delivered on any telephone. It does not require a mobile phone or a smart phone.
3. The MSC looks in the VLR and determines where to route the call. The MSC gets the CFNRC state as the HLR updates the VLR, so the call is routed to the CRBT server.
4. The call arrives at the CRBT server.

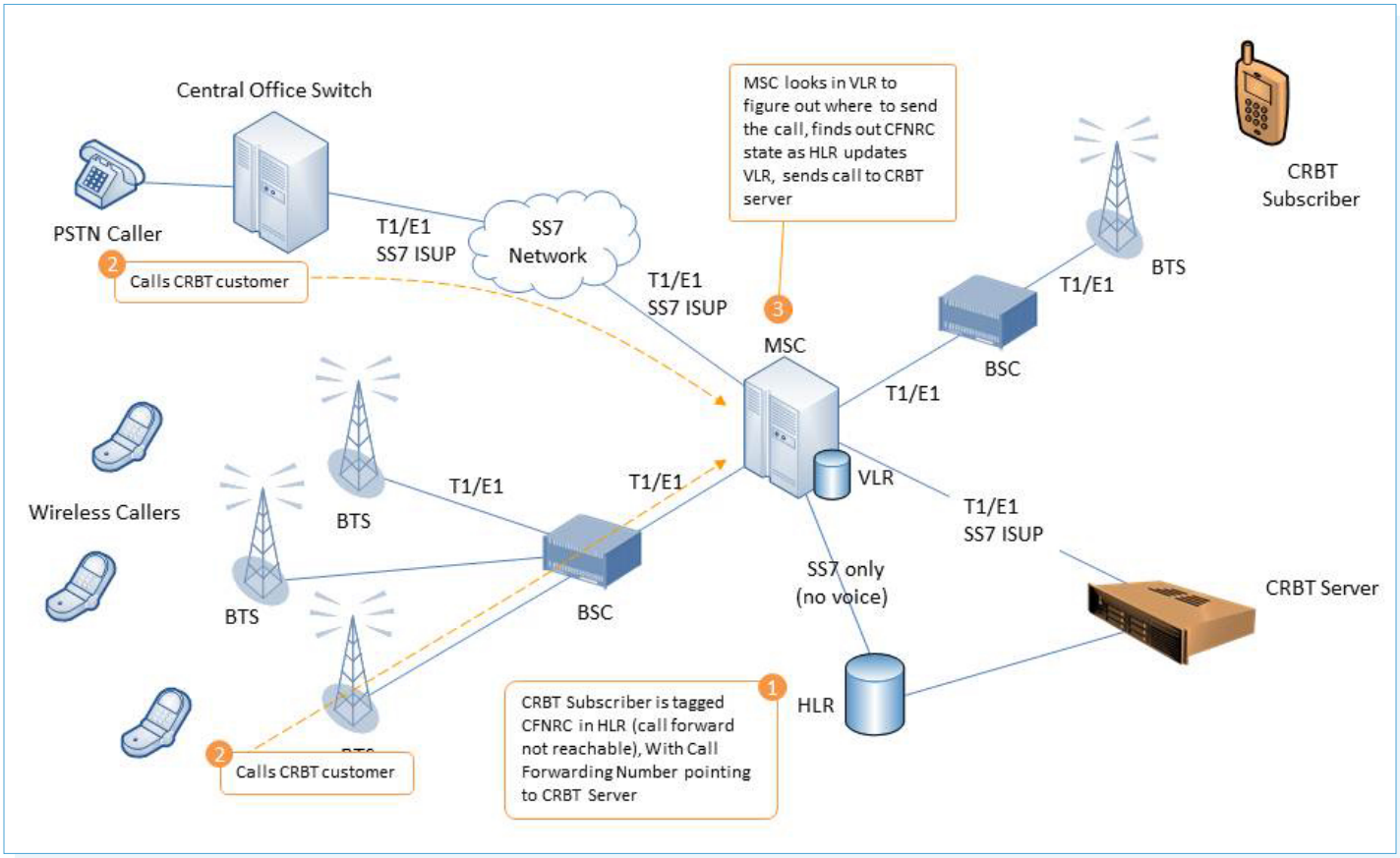


FIGURE 3: INTERCEPTING THE INBOUND CALL

## STEP TWO: Determine the Ring Back Tone to Play to the Caller

The CRBT server receives the Caller ID as part of the SS7 information. It then uses an internal database (or whatever method is employed by the CRBT server) to determine which audio file should be played to this particular caller.

| Caller phone number | ID | Ringtone file to play |
|---|---|---|
| 416-555-1234 | Doug | lady_gaga_born_this_way.mp3 |
| 514-555-9876 | Frederic | celine_dion_my_heart_will_go_on.mp3 |
| 905-555-4567 | Nenad | dora_the_explorer_theme.mp3 |
| 905-555-4321 | Linda | acdc_back_in_black.mp3 |
| 212-555-1234 | Jeff | lion_king_broadway_theme.mp3 |

## STEP THREE: Connect the Caller to CRBT Server (with SS7)

The call is then connected to the CRBT server and the selected audio file is streamed to caller.

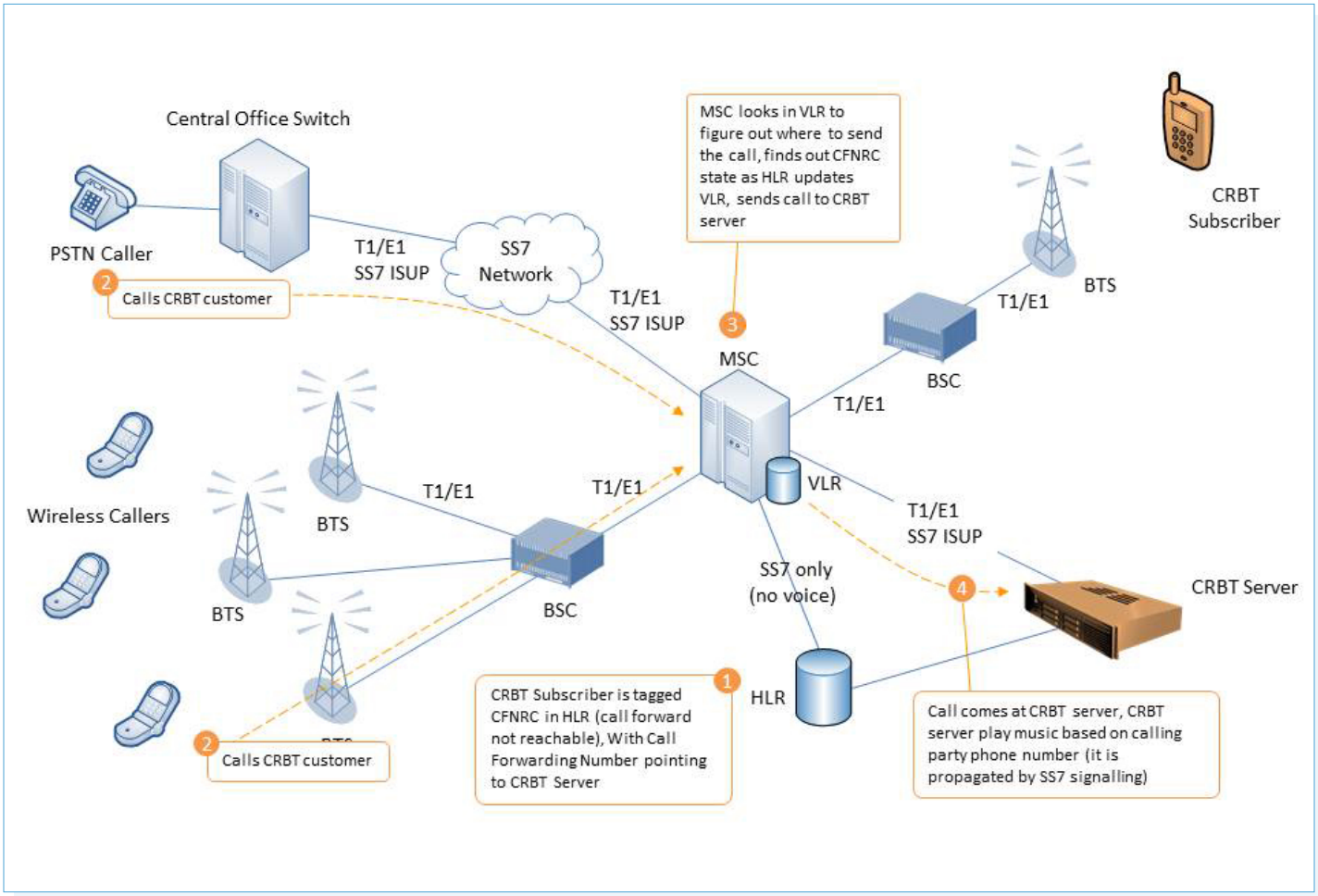


FIGURE 4: CALL ANSWERED BY CRBT SERVER

## STEP FOUR: Play CRBT to Caller While Placing Outbound Call to Subscriber

While the CRBT server is playing the CRBT, it places a call to the subscriber.

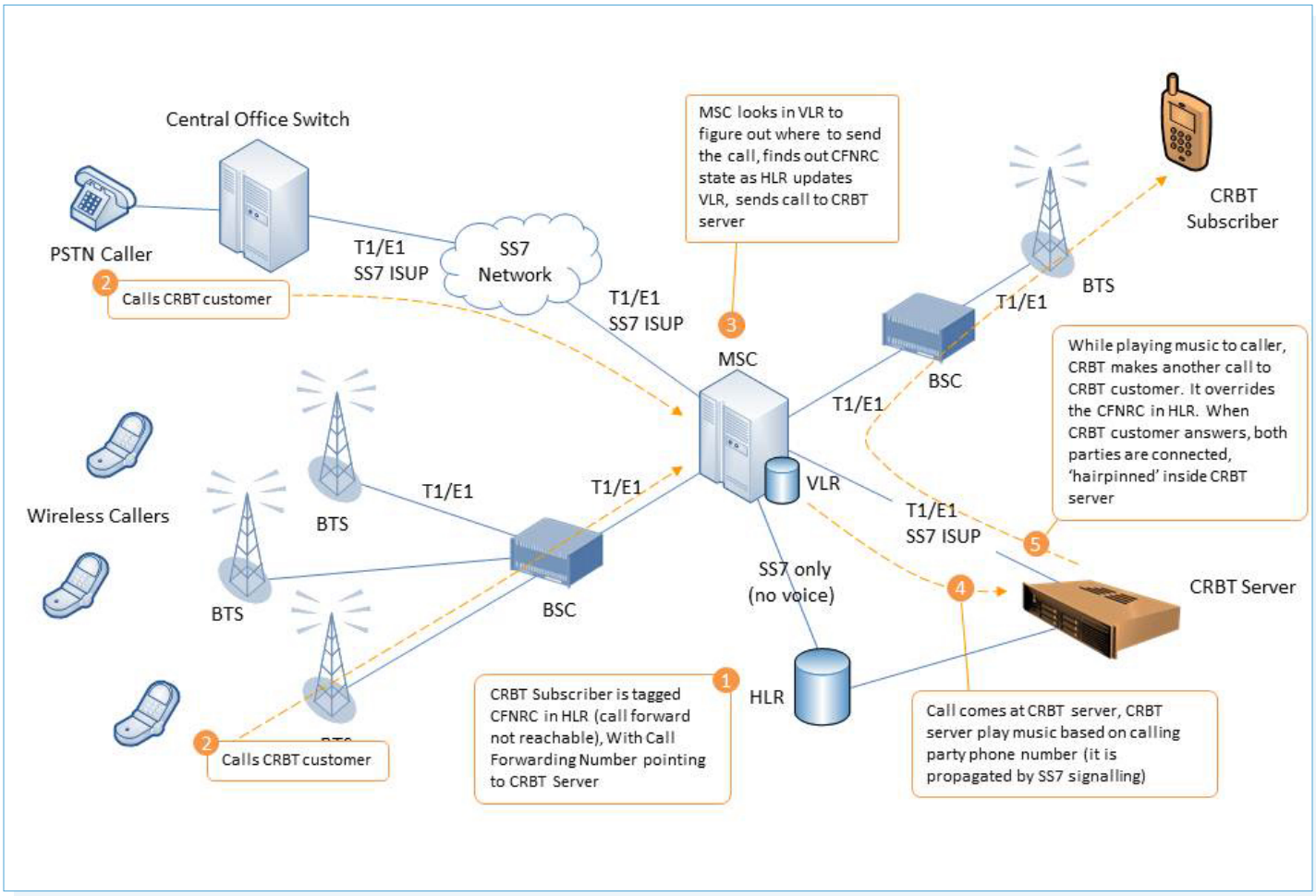


FIGURE 5: PLAYING CRBT WHILE SEARCH FOR SUBSCRIBER

### STEP FIVE: Subscriber Answers Call

The music is stopped and the inbound caller is bridged to the subscriber. Using this method, the CRBT server remains in the call path for the entire length of the call. This allows the CRBT server to provide additional services to the call (like call recording).

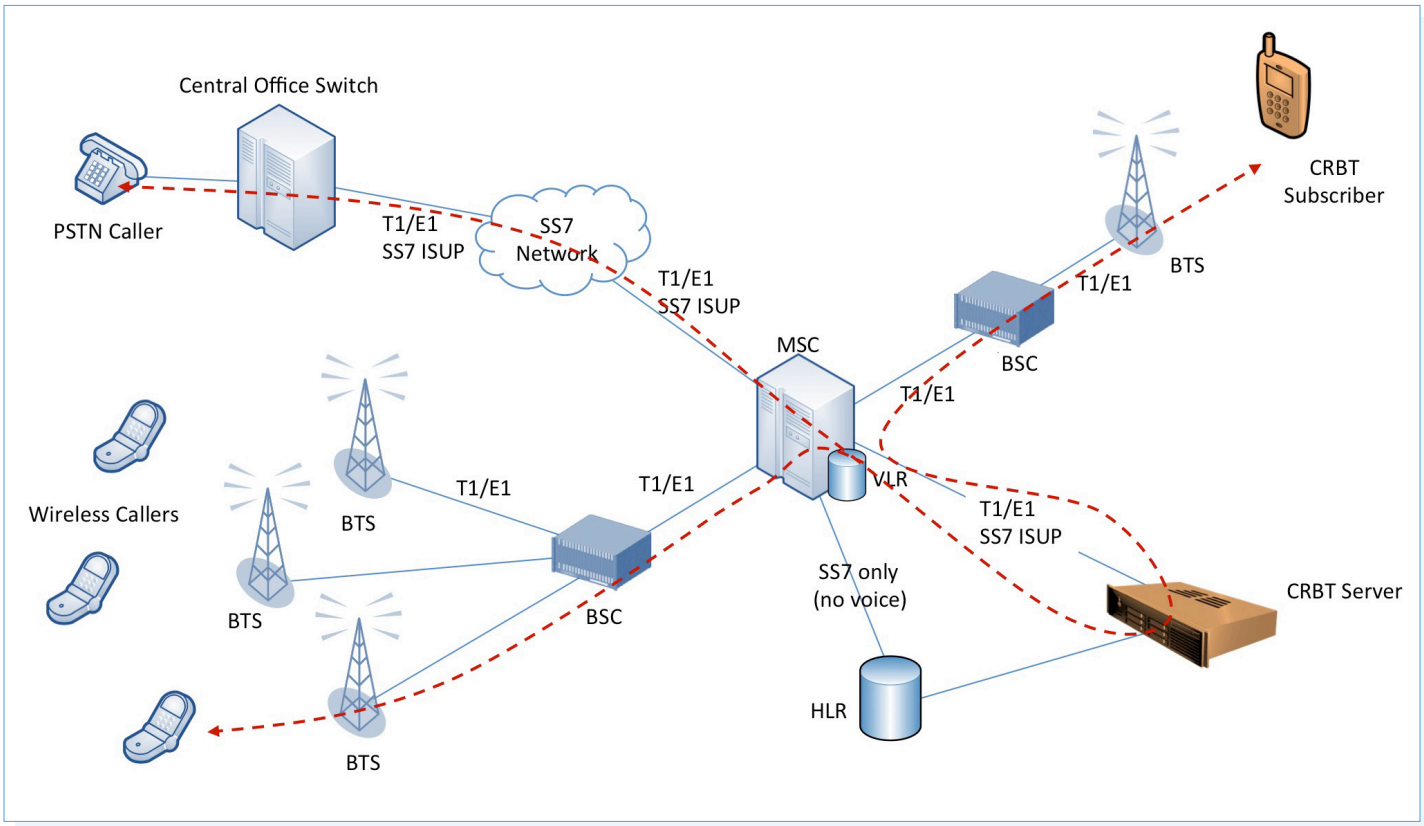


FIGURE 6: CALL CONNECTED TO SUBSCRIBER

# Building a CRBT Server with Sangoma and Open Source Telephony (OST) Software

Asterisk® and FreeSWITCH® have long been used to provide value-added services to landline subscribers. The rich feature-sets available in both of these platforms (including the ability to stream audio and switch calls) has enabled a significant amount of technical and creative innovation in the services that could be offered. However, the lack of a stable open source SS7 stack has limited Asterisk and FreeSWITCH developers when attempting to deliver these same services to the mobile market.

The Sangoma NetBorder SS7 VoIP gateway can be easily integrated with either Asterisk or FreeSWITCH to enable these platforms to communicate with the SS7 network and provide value-added services, including CRBT, to the mobile market in a very cost-effective implementation.

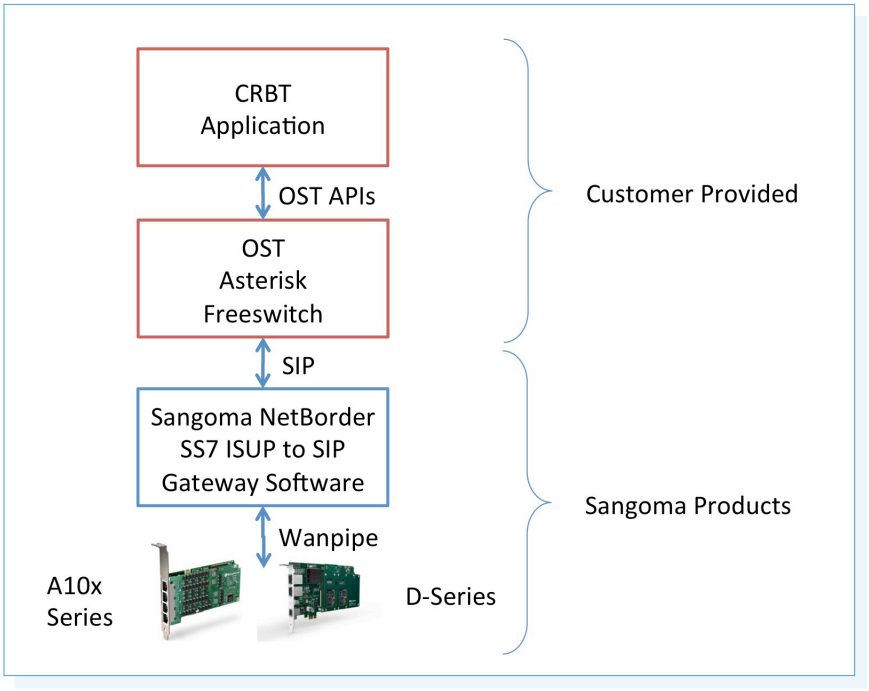


FIGURE 7: A CRBT SERVER BUILT USING SANGOMA PRODUCTS

The commercial SS7 signaling stack at the foundation of Sangoma's NetBorder SS7 to SIP Gateway software product provides a field-proven and very stable product at a very competitive price. The NetBorder SS7 Gateway (NSG) is fully compatible with Asterisk and FreeSWITCH for simple and efficient integration that leverages the existing architecture of these two OST software environments and ensures seamless SS7 operation. The Asterisk and FreeSWITCH platforms integrate with NSG via a SIP trunk SS7 call specific information is passed to the gateway with the help of additional SIP headers.

# Conclusion

The mobile value-added services market is exploding with the recent highlight of the color ring back tone application. Sangoma, when implemented along with any of the popular Open Source Telephony platforms like Asterisk or FreeSWITCH, can deliver a low-cost, easy to maintain solution for this lucrative market.

## ABOUT SANGOMA TECHNOLOGIES

Sangoma is a leading provider of hardware and software components that enable or enhance IP Communications Systems for both telecom and datacom applications. Enterprises, SMBs and Carriers in over 150 countries rely on Sangoma's technology as part of their mission critical infrastructures. Through its worldwide network of Distribution Partners, Sangoma delivers the industry's best engineered, highest quality products, some of which carry the industry's first lifetime warranty. The product line in data and telecom boards for media and signal processing, as well as gateway appliances and software.

Founded in 1984, Sangoma Technologies Corporation is publicly traded on the TSX Venture Exchange (TSX VENTURE: STC). Additional information on Sangoma can be found at http://sangoma.com.