



**kolibri
systems**

Telephony

white paper

Kolibri release 6 and higher

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Kolibri Telephony

Abstract

This white paper describes the possibilities and benefits of integration of telephone communication into the Kolibri control room solution. It also provides background information on how this is accomplished.

General Kolibri background

The Kolibri control room solution is used in operation centers to communicate with field personnel. Please refer to the general Kolibri white paper for an overview of the Kolibri control room solution.

Kolibri can be integrated with several types of communication systems and provides a unified user interface for communication using these systems.

The particular class of communication systems addressed in this white paper is a telephone system.

The external telephone systems may be private branch exchanges (PBXs) or gateways to a public telephone network.

The problem without integration

Without integration of telephone communication into Kolibri the user typically has a separate user interface for telephone communication, e.g. one or more stand-alone desk phones (Figure 1).

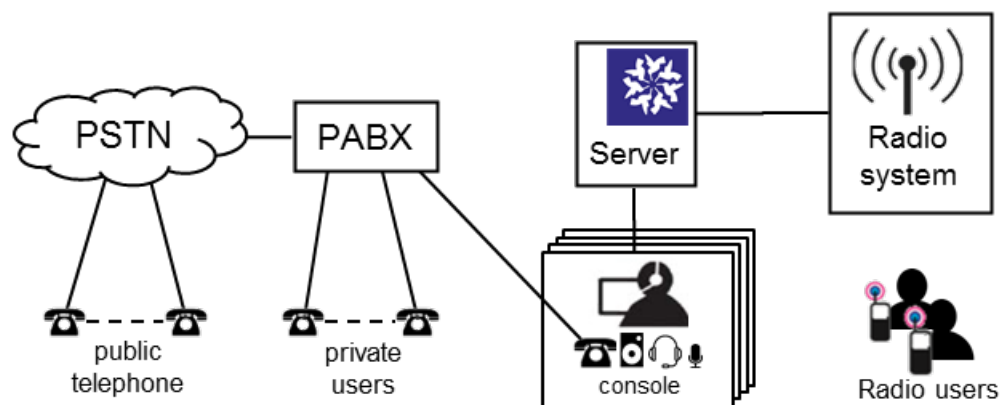


Figure 1: Without integration

The main problem with this setup is that the user needs different interfaces for telephony and Kolibri supported communication. Typically the user utilizes a microphone and one or more loud speakers, or alternatively a headset or handset, as an audio interface for voice communication. It is obviously undesirable to use multiple of these audio interfaces on the

same work desk.

The benefits of integration

The main benefit of telephony integration into Kolibri is the provisioning of a single unified user interface for voice communication, both for audio, control and signalling (Figure 2).

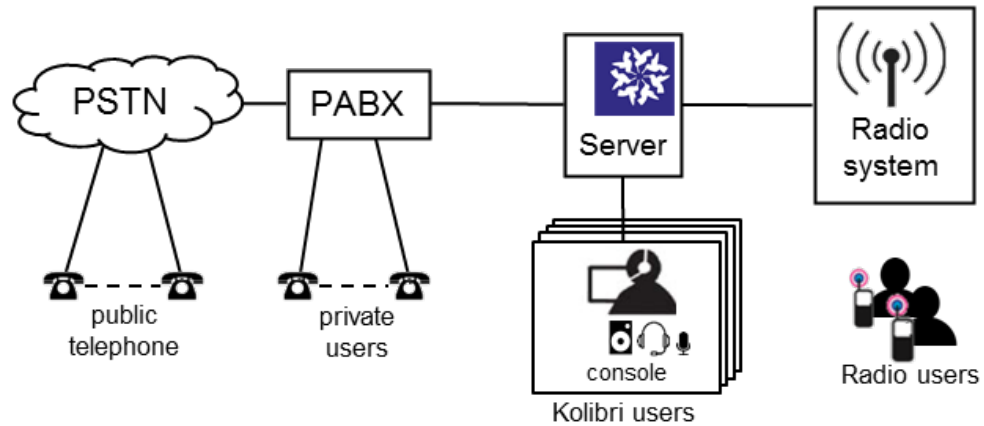


Figure 2: With integration

Additional benefits are the inclusion of telephone communication in the Kolibri logging and the versatile configurable automated call handling by Kolibri, e.g. routing calls to specific users or patching calls to other communication channels.

SIP interface

Key to telephony integration is the SIP protocol used to connect to external telephone systems. From a Kolibri point of view each external telephone system is a SIP proxy. The majority of the current generation of telephone systems support a SIP interface.

Architecture

Kolibri utilizes two components at the server level to connect to an external telephone system (Figure 3).

The KoliSIP gateway is the Kolibri SIP peer communicating with a SIP proxy.

The KoliAudio gateway is the Kolibri media peer communicating with the external media gateways (either a direct end user equipment or the telephone exchange). The KoliAudio gateway performs the RTP to Kolibri audio interface. Kolibri audio is implemented as multicast audio streams on the Kolibri IP infrastructure (LAN).

The KoliSIP gateway implements a number of configurable communication devices (“user agents” in SIP terminology).

Each communication device can handle exactly one telephone call. A communication device can be configured with a SIP username (usually a telephone extension number).

The communication devices will register themselves at the SIP registrar on the external telephone system. Effectively this informs the PBX of the available extensions in Kolibri.

Multiple communication devices may be configured with the same extension number to

provide the capability to handle multiple simultaneous calls to an extension number.

The communication devices are pooled at the server level. This means they are not associated with a particular Kolibri console. Instead they can be utilized and controlled by all consoles, thus providing a very flexible sharing of those resources amongst the different consoles typically required in control room situations.

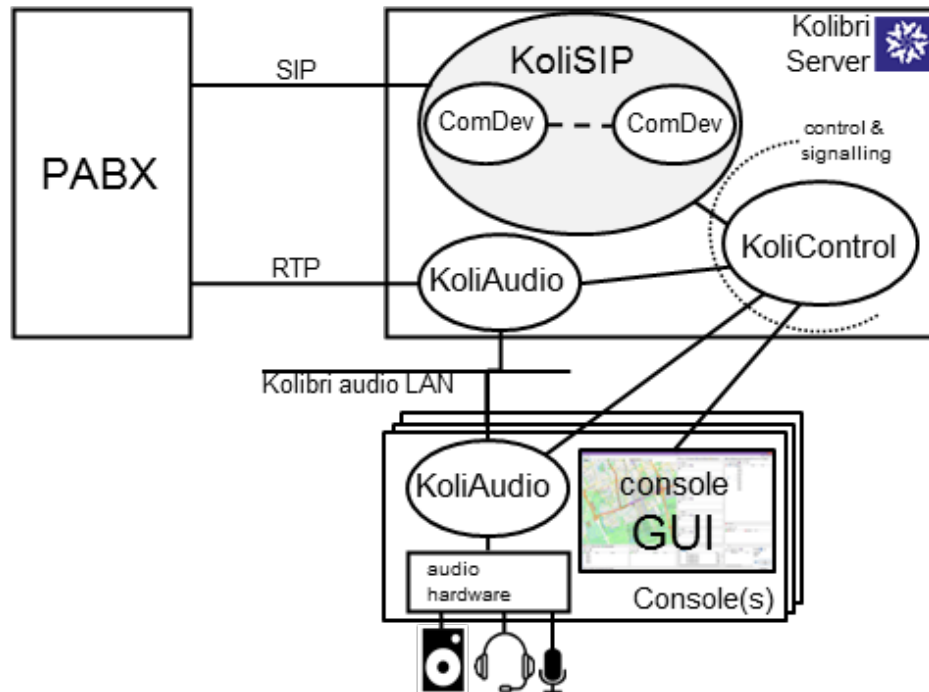


Figure 3: Architecture

Console user interface

The Kolibri console provides an audio interface for acoustic signalling and voice communication and a graphical user interface (GUI) for control and signalling.

The GUI can be configured to contain any number of resources the user may use to control the communication.

For telephony this could for example be a box for each specific telephone extension (see Figure 4). This box contains an icon to signal an incoming call and buttons to accept and control a call. The user can call a telephone subscriber, monitor and accept incoming calls, terminate a call, put a call on hold, forward a call or patch a call to another communication channel.

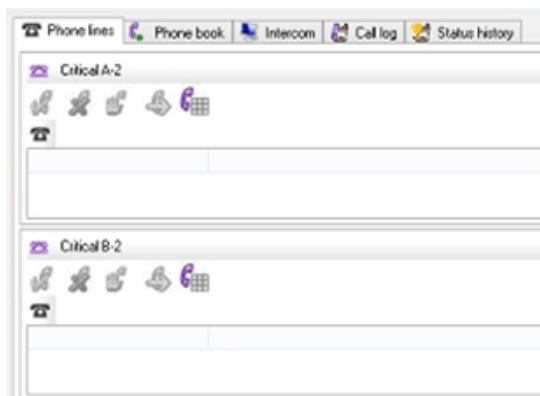







Figure 4: GUI example

Basic Kolibri telephony features:

-  Accept call
-  Reject call
-  Dial a number
-  On hold
-  Transfer call

Routing and handling of incoming calls

Upon receiving a SIP invite message KolibriSIP searches a free communication device with the called extension number which is not engaged in a call. Remember that multiple communication devices may be configured with the same extension number.

If there is no communication device with the called extension number or a free device is not found, KolibriSIP returns an error message to the calling party. If a free device is found it is allocated to the call and signals the incoming call on each console which has this extension number configured in the GUI (“ringing”).

If a console user accepts the incoming call then the call is allocated to the console and the audio path between the telephone subscriber and the console is established. The user then performs all subsequent handling of the call.

Automated handling of incoming calls

The Kolibri server can be configured to perform automated handling of an incoming call. This could for example be done to automatically accept the call and patch it with a communication channel (e.g. a radio channel or public address system).

If the patched channel is half duplex then the required push-to-talk (PTT) signalling for this channel may be derived from vox detection on the incoming telephone audio stream or alternatively be controlled by incoming SIP messages, depending on the capabilities of the used telephone subscriber equipment (a PTT mechanism on the telephone must be available for this to work).

Direct routing of calls to radio channels

Telephone calls may also be routed directly between radio systems and telephone systems, without the previously described intermediate handling by Kolibri (see Figure 5).

This requires the radio system to be directly connected to the telephone system, usually also through a SIP interface.

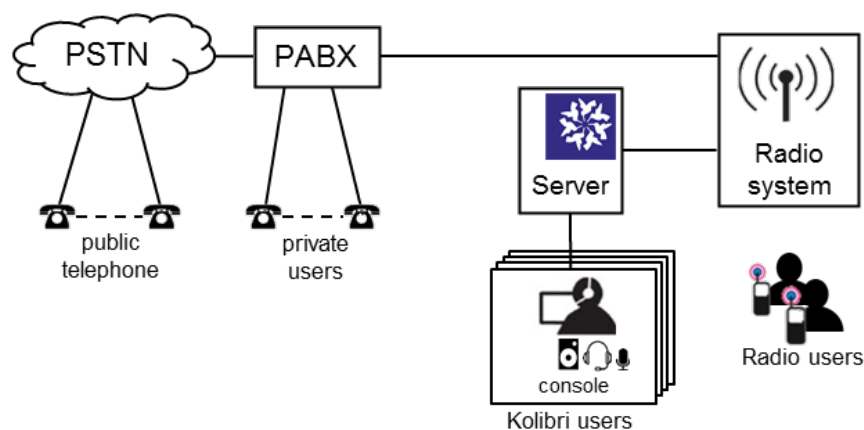


Figure 5: Direct link between telephony system and radio system

This approach removes the intermediate Kolibri hop for calls between telephone users and radio users. If no console user intervention or control is required this is a more straightforward approach.