



# Assistive Technology for Hearing Impaired



# Assistive Technology for Hearing Impaired Applications

## To Improve Hearing with Hearing Devices

- By utilizing tele-coils in Hearing Devices
  - For public spaces if .....
  - ....a P.A. System is in use
  - ... background noise is present
  - ...sound barriers are present.



# Assistive Technology for Hearing Impaired

## Current Technology

- Induction Loop Systems
  - Different technologies
    - Different Applications
- FM / Radio System
  - Personal System
  - Semi Fixed Installed Systems.



# Assistive Technology for Hearing Impaired

## Current Technology

### Induction Loop Systems

- Different technologies
  - Different Applications



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### FM / Radio System

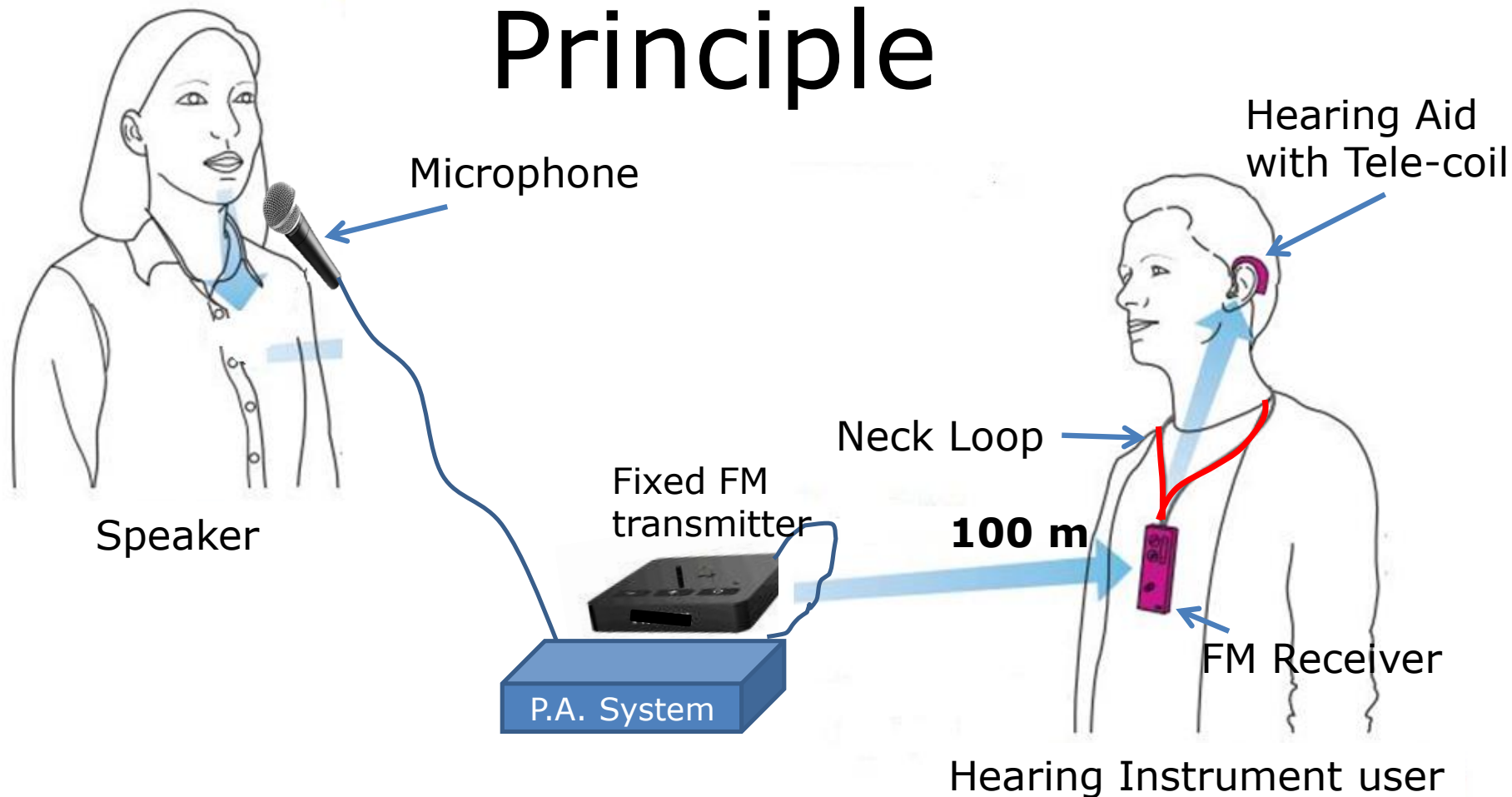
- Personal System
- Semi Fixed Installed Systems



# Assistive Technology for Hearing Impaired

## Semi-Fixed FM/Radio Systems

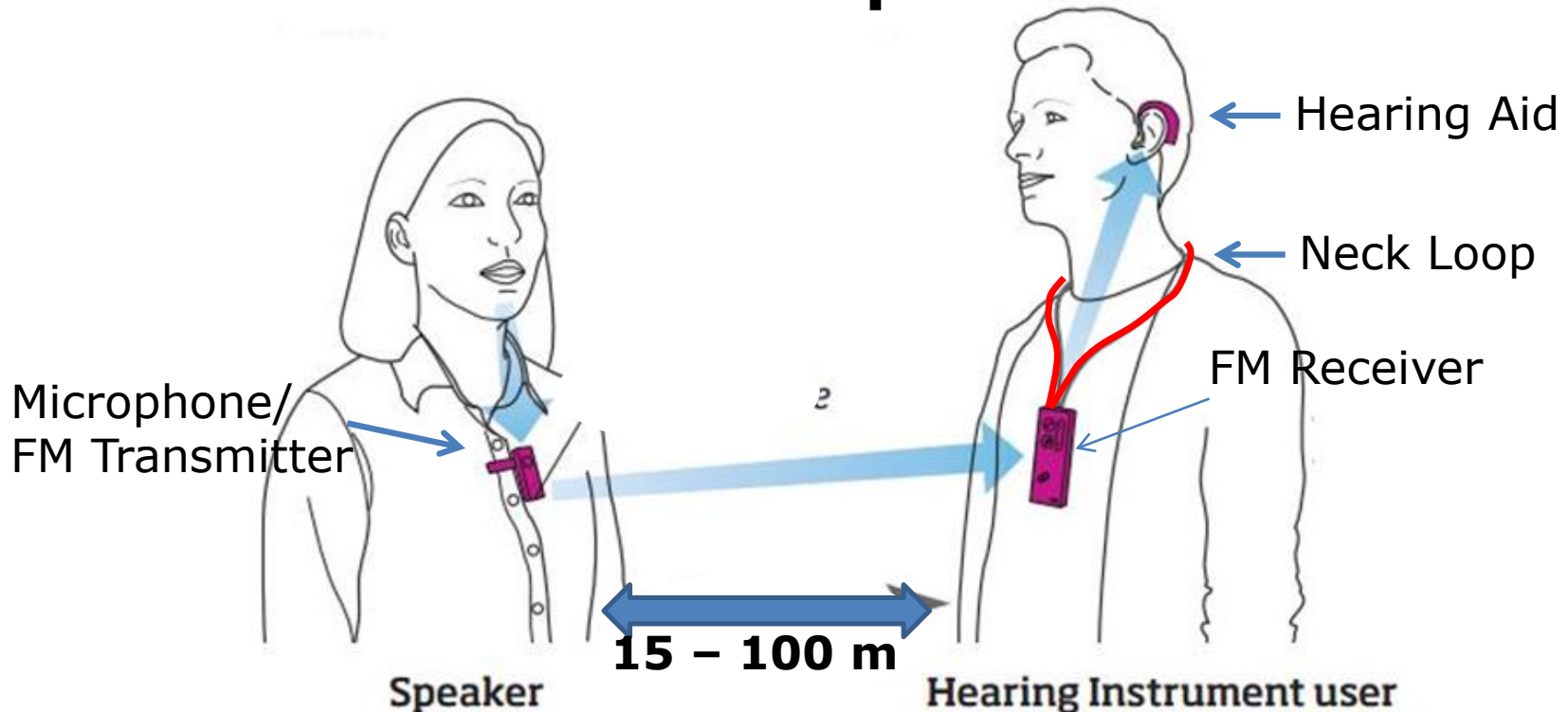
### Principle





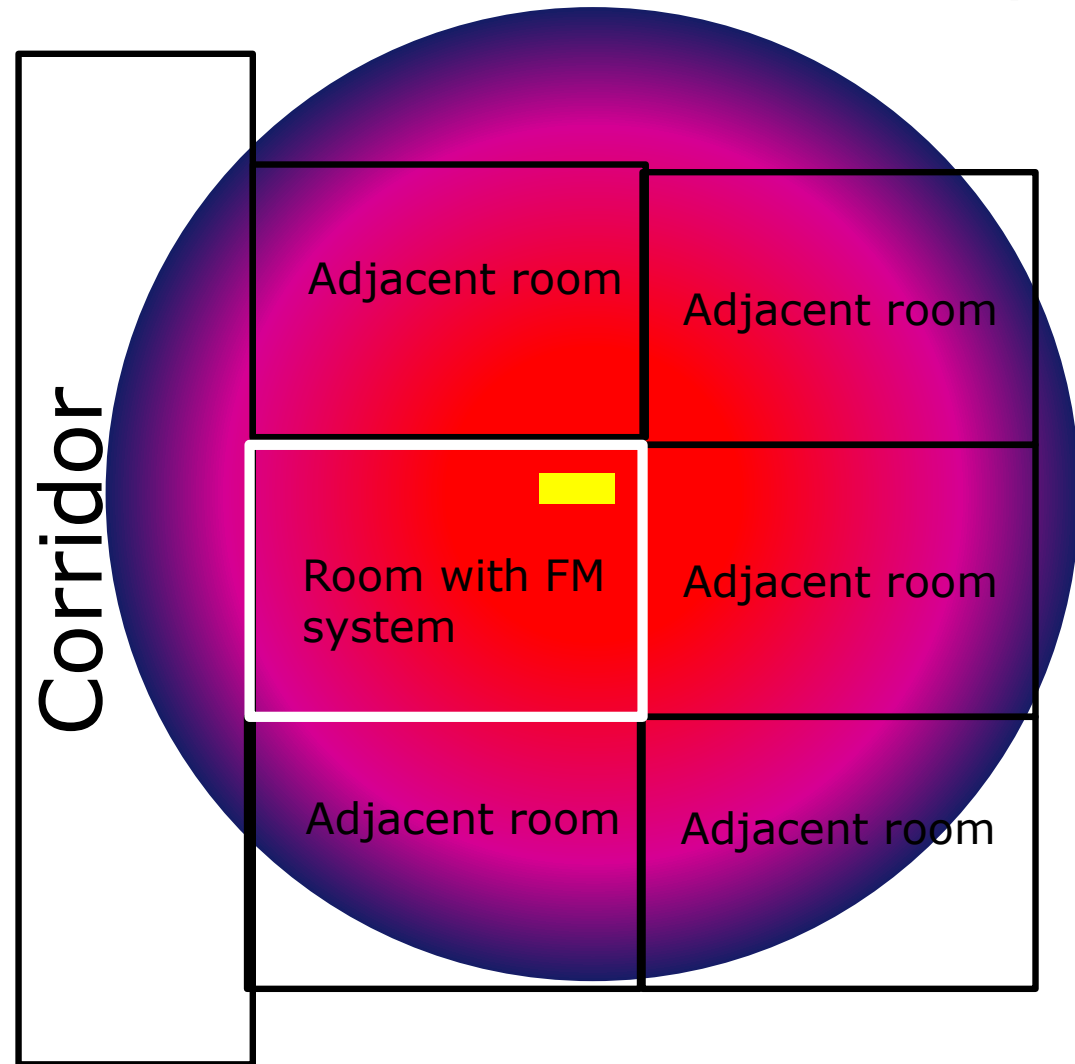
# Assistive Technology for Hearing Impaired Personal FM/Radio Systems

## Principle





# Room with Personal or Semi-Fixed FM/Radio Systems



- Covers an area of about 100 in radius from transmitter
- NO Interference with FM systems in adjacent rooms as long as they are on a different frequency
- Signal MAY BE overheard in all adjacent rooms and corridor if a FM-receiver with same frequency is used.



# Installation / Hardware Setup

## FM Systems

### Fixed FM Transmitter

- Ideally below/above AV amplifier/mixer.
- Normal audio connections to AV equipment
- Can transmit all sounds provided by AV equipment
- 220V power supply

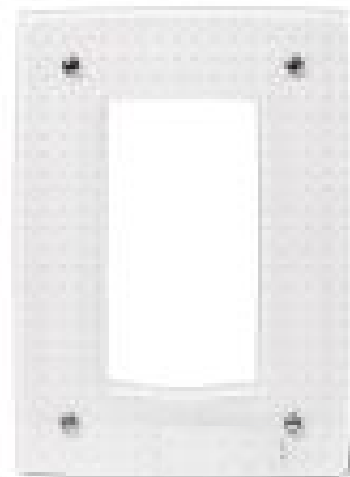


### Charging Case

For charging and safe keeping of Receiver and personal Transmitters.

Automatically switches FM receivers frequency  
Installed at every entrance door to rooms.  
Battery driven.

### Optional WallPilot







# Semi Fixed FM system Operation

## Hardware

- FM Transmitter and PA system installed and connected to each other
- FM Receivers in storage with operator staff

## Operator responsibility

- Switch on Amplifier and FM transmitter
- FM Receivers charged, tested and set to particular room frequency
- Hand FM Receiver to visitor upon request & explain usage
- Receives FM transmitter back from visitor
- Checks, cleans (sterilizes) and put back on stock

## Hearing impaired visitor

- Requests FM Receiver
- Puts Neck-Loop around neck and switches FM receiver on
- Switches own hearing aid to T or MT position
- Hears all signals at personal appropriate level
- Returns FM Receiver



# Personal FM system Operation

## Hardware

- FM Transmitters and Receivers in storage with operator staff

## Operator responsibility

- FM Receivers & Transmitters charged, tested and set to particular room frequency
- FM Transmitter allocated to speaker according to room
- Hand FM Receiver to visitor upon request & explains usage
- Receives FM transmitter back from visitor
- Checks, cleans (sterilizes) and put back on stock

## Hearing impaired visitor

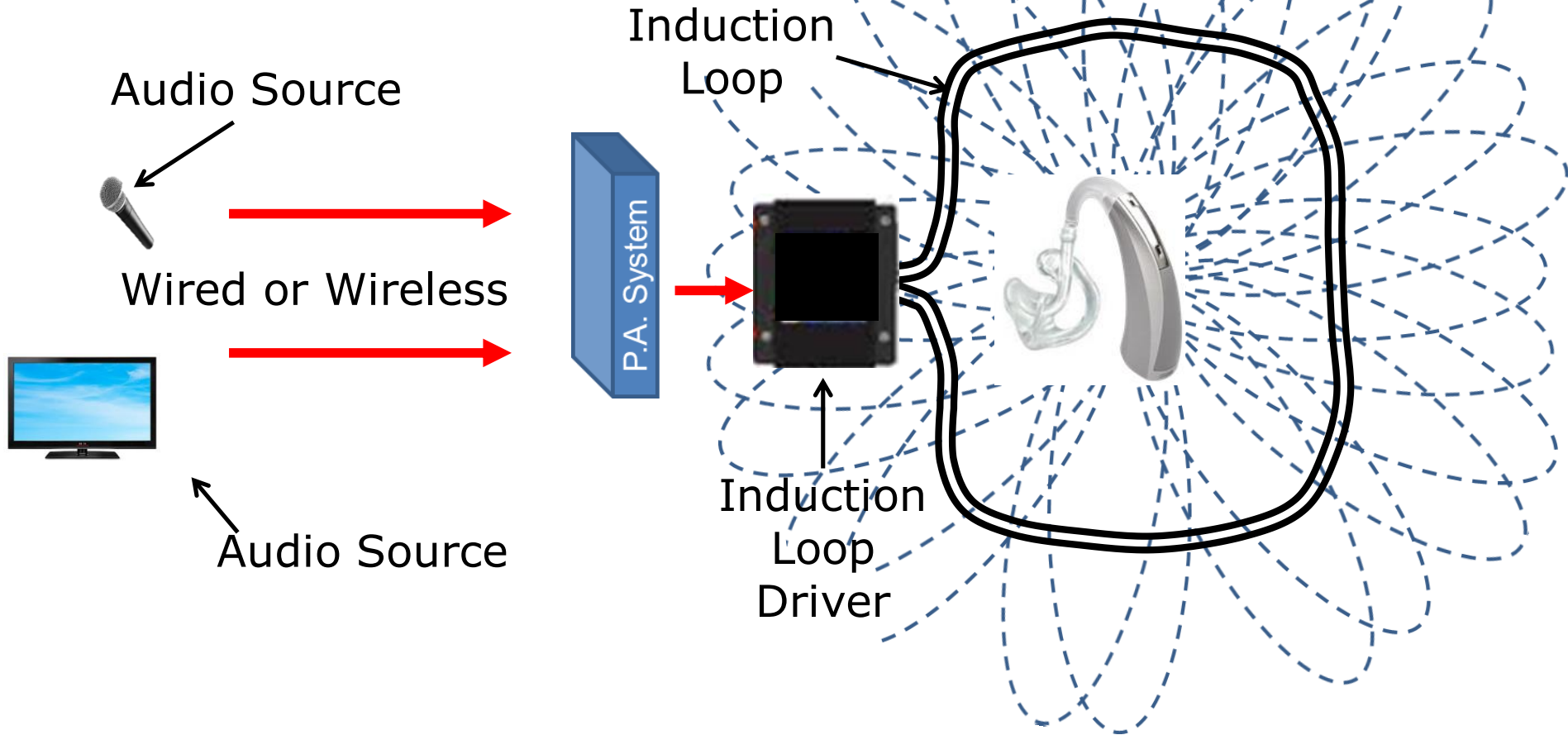
- Requests FM Receiver
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# Assistive Technology for Hearing Impaired

## Induction Loop System

### Principle

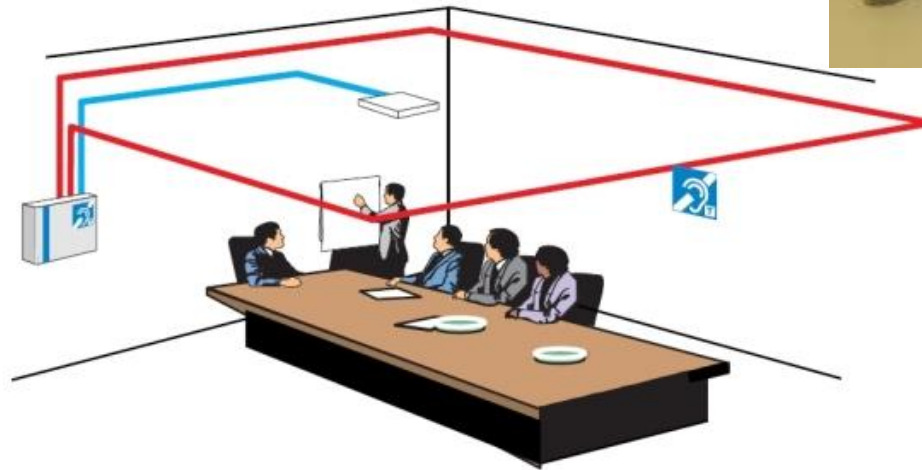
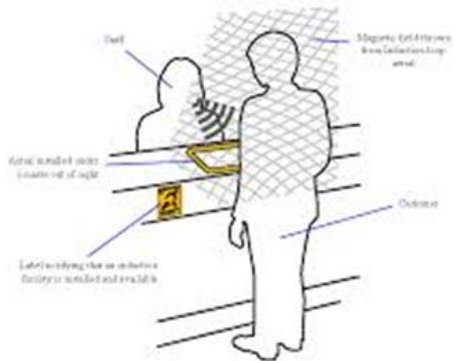
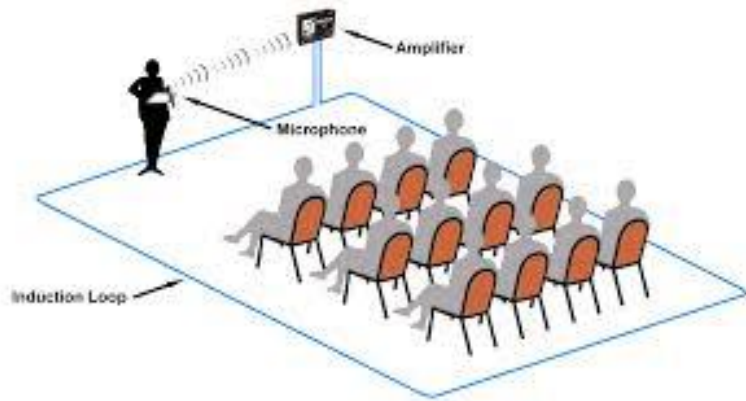




# Assistive Technology for Hearing Impaired

## Induction Loop System

# Principle



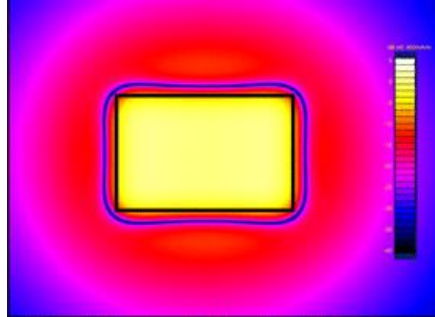


Loop Design Solutions

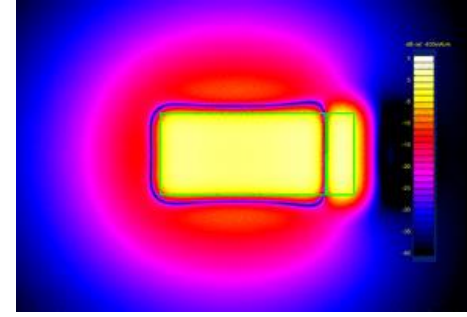
# Hearing Loop Principles – Loop Layouts



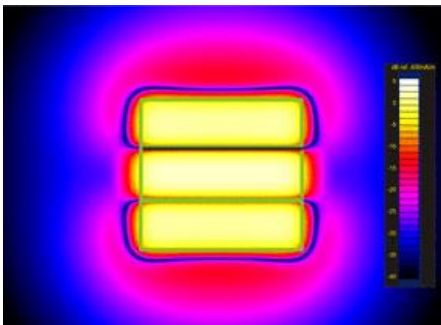
Overspill Loop



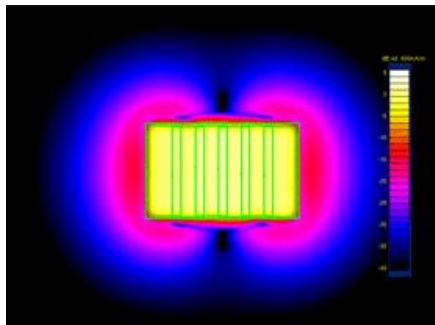
Perimeter Loop



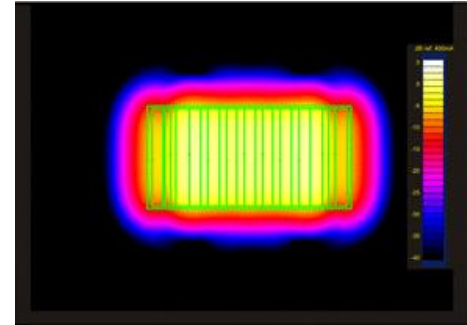
Cancellation Loop



Single Array



Low Loss  
MultiLoop™

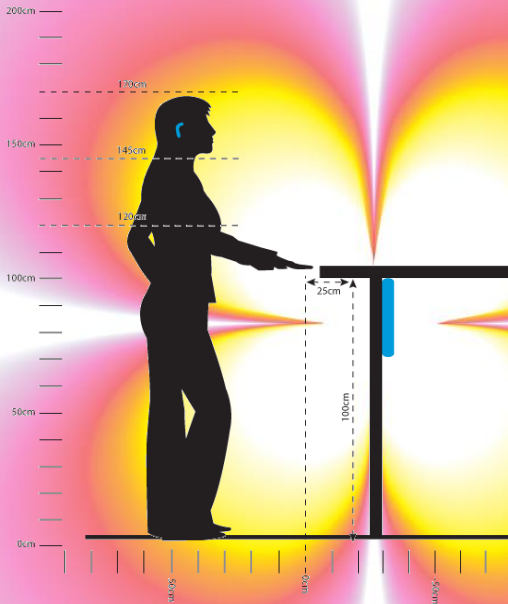


Low Spill  
MultiLoop™



# Overspill Loops

**Only solution for counters, Intercom systems and many other situations**

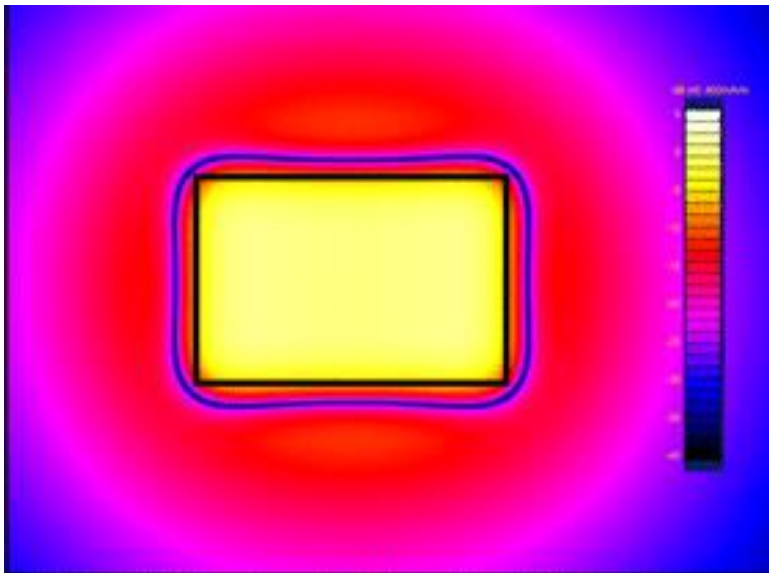


- Single Loop Driver System for up to coverage area of 35m<sup>2</sup>
- The overspill effect is used to transmit the signal
- Counter material needs to be considered
- Height and distance of the listener must be considered
- Computer designed layout and equipment definition



# Perimeter Loops

**For applications where spill is not an issue**



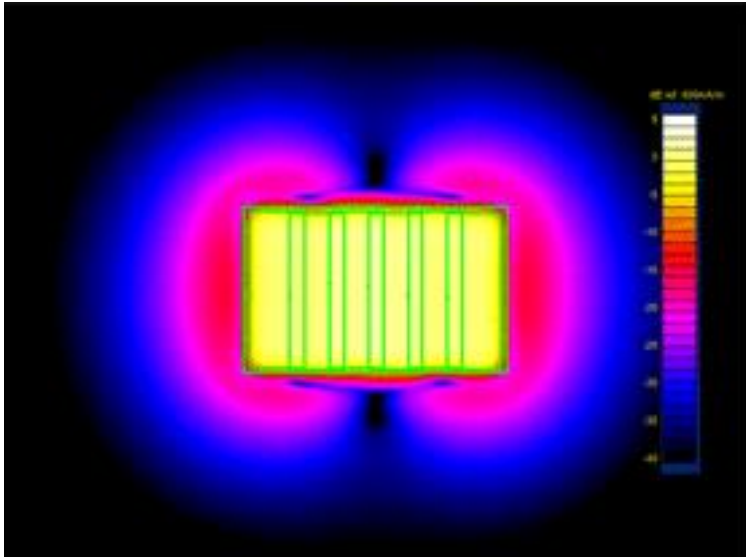
Perimeter Loop

- Single Loop Driver System for a coverage area of up to 3,300m<sup>2</sup>
- Stone, brick or wooden construction building
- No metal in building construction, roof or floor
- Computer designed layout and equipment definition



# Low Loss MultiLoop™

## Used to minimise metal loss



Phased Array

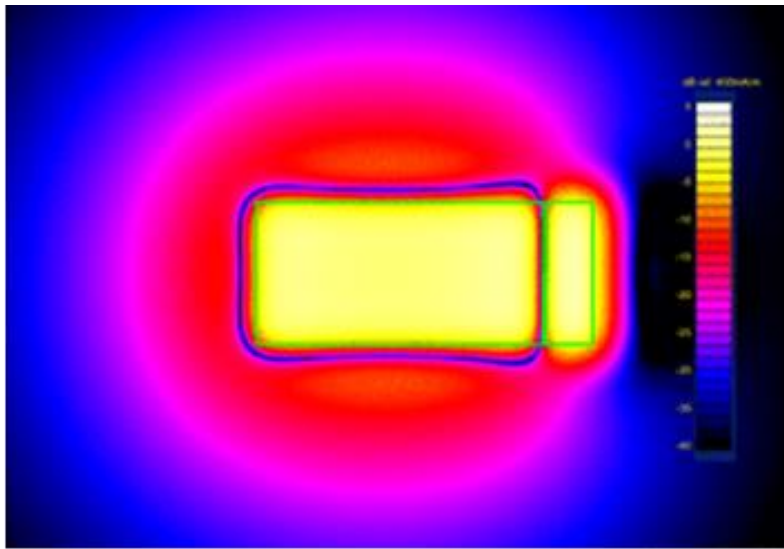
- Single Loop Driver System for a coverage area of up to 3,300m<sup>2</sup>
- Essentially two loop arrays, one on top of the other driven by one single driver.
- Audio separated by 90° phase shift
- Used for large areas
- Irregular shaped rooms
- Computer designed layout and equipment definition





## Cancellation Loop™

**Used to limit interference with a performance stage**



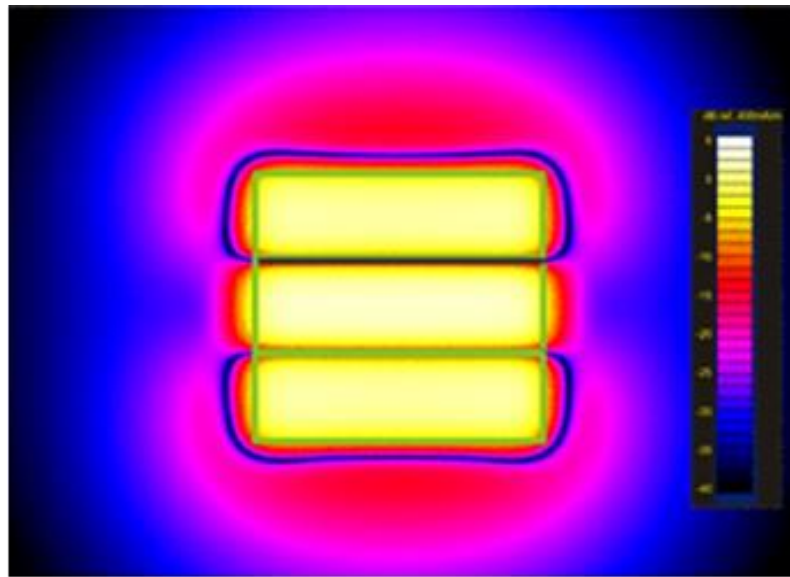
Cancellation Loop

- Single Loop Driver System for a coverage area of up to 3,300m<sup>2</sup>
- Essentially two loop arrays, one on top of the other
- Terminator Loop in a certain area to limit spill in a certain direction
- Computer designed layout and equipment definition



# Single Array Loop™

Used for large areas without metal loss



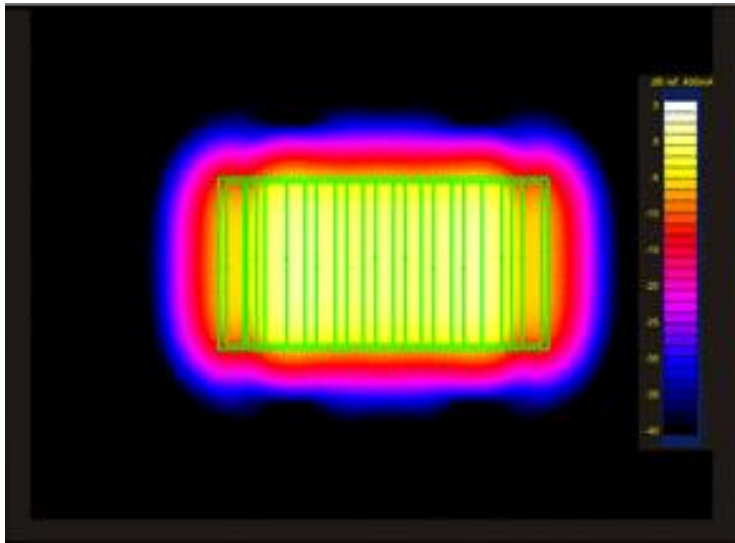
Single Array

- Single Loop Driver System for a coverage area of up to 3,300m<sup>2</sup>
- Essentially two loop arrays, one on top of the other
- Audio separated by 90° phase shift
- Irregular shaped rooms
- Computer designed layout and equipment definition



## Low Spill MultiLoop™

**Used where low spill and maximum privacy is required**

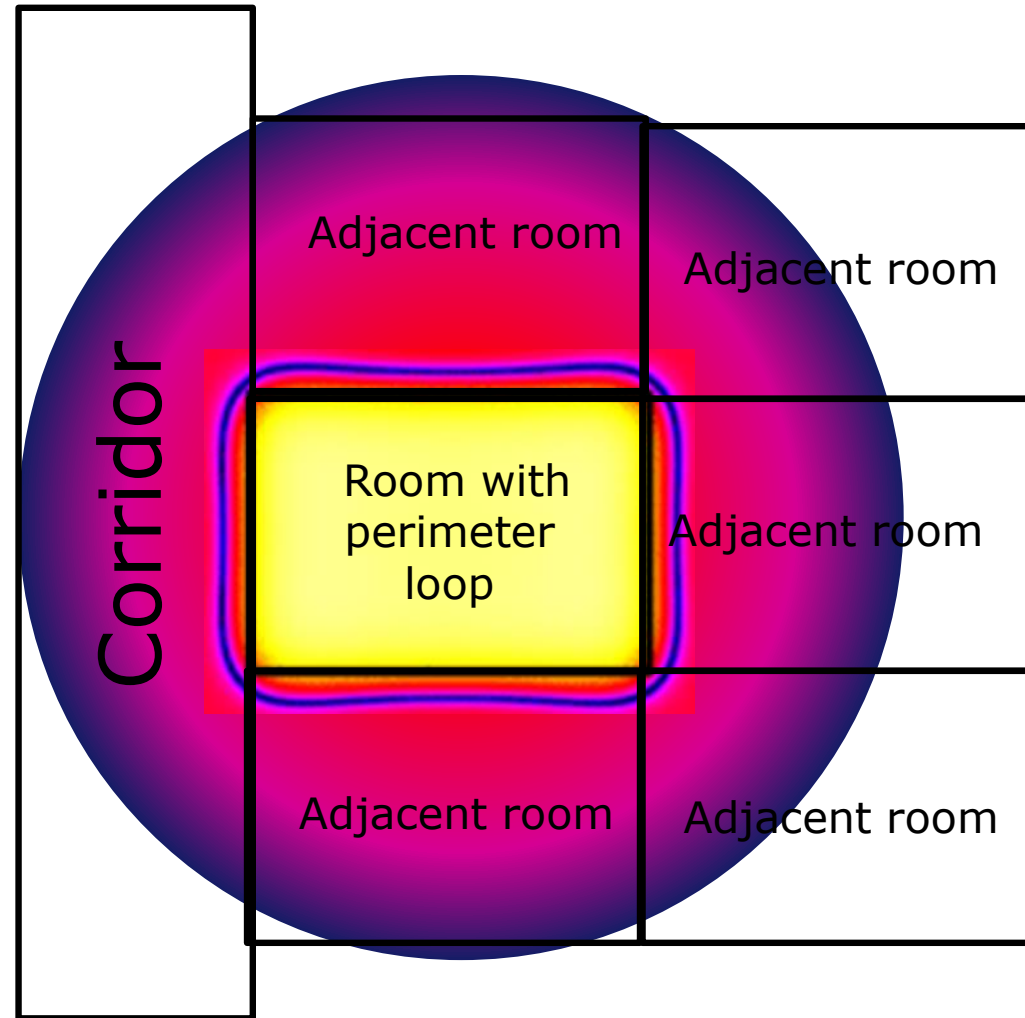


Low-Spill Phased Array

- Single Loop Driver System for a coverage area of up to 3,300m<sup>2</sup>
- Similar to a Loss Control Phased Array design
- Uses precisely dimensioned terminator loops to reduce spill
- Computer designed layout and equipment definition
- Also controls metal loss



# Example room with perimeter loop system

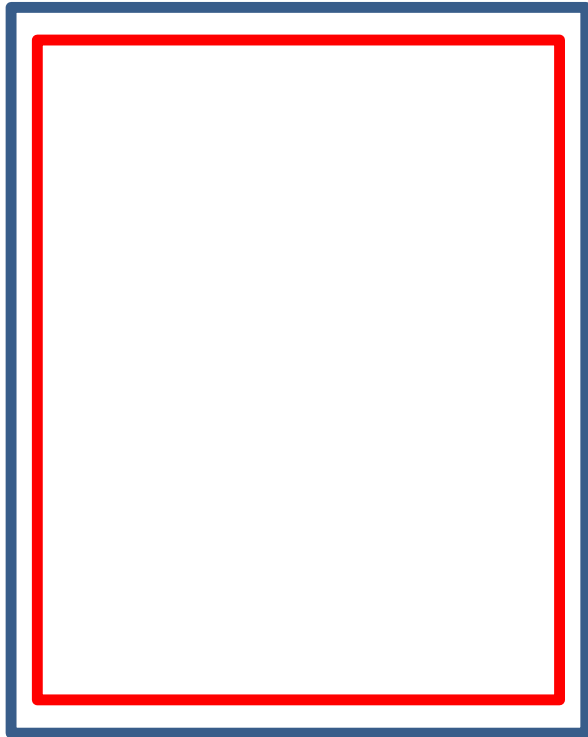


- Interference with loops in all adjacent rooms
- Signal will be overheard in all adjacent rooms and corridor



# Installation / Hardware Setup

## Perimeter Loop



### Loop

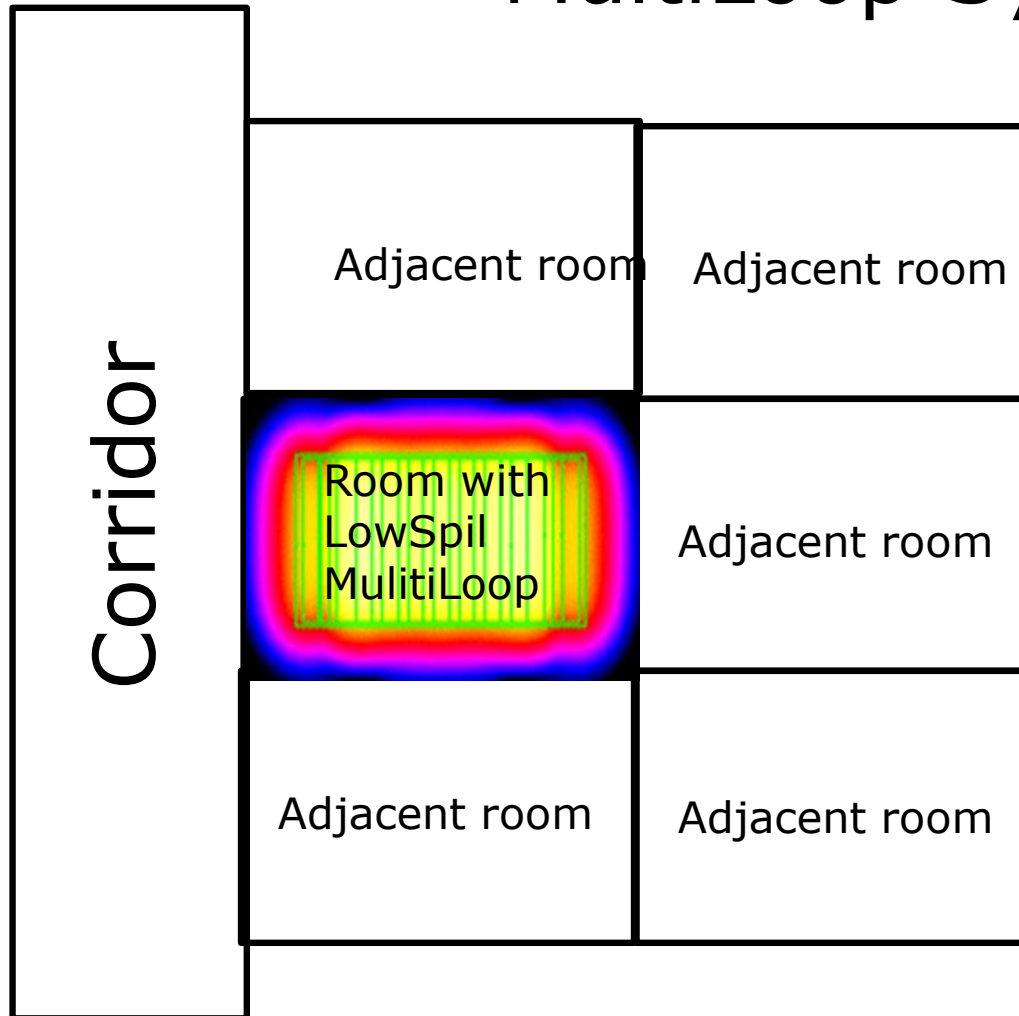
- 0.25 mm thick copper tape under carpet or vinyl flooring around perimeter of room.
- If tile or wood flooring is used, a 3mm Direct Burial Cable will be laid inside the screed concrete layer.

### Single Loop Driver

- Ideally not more than 3 m from termination point of loop, beside or below/above AV amplifier/mixer.
- Normal audio connections to AV equipment
- Can transmit all sounds provided by AV equipment
- Requires a 19 inch rack mount or similar space
- 220V, 3 Pin Grounded Power plug.



# Example Room with Low Spill MultiLoop System

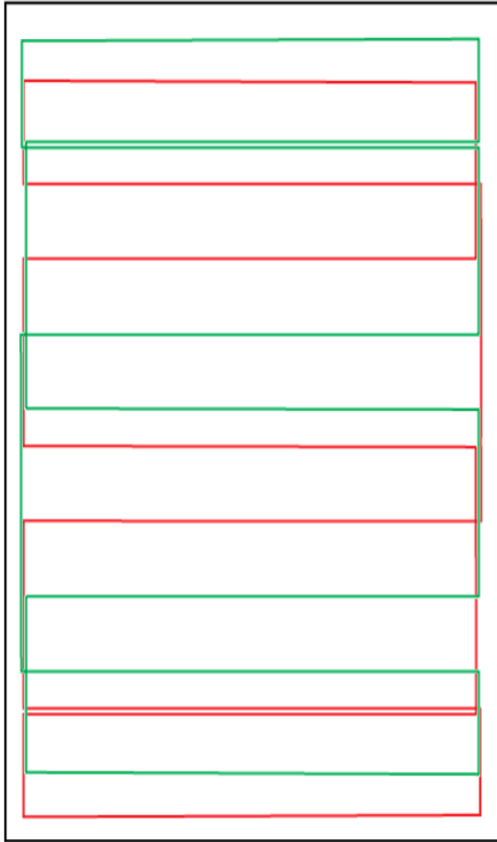


- No interference with loops in all adjacent rooms
- Signal will NOT be overheard in adjacent rooms and corridor.



# Installation / Hardware Setup

## Low Spill MultiLoop



### Loop

- 0.25 mm thick copper tape under carpet or vinyl flooring.
- Two exactly calculated phase shifting loop arrays are laid across coverage area.
- If tile or wood flooring is used, a 3mm Direct Burial Cable will be laid inside the screed concrete layer.

### Single Loop Driver

- Ideally not more than 3 m from termination point of loop beside or below/above AV amplifier/mixer.
- Normal audio connections to AV equipment
- Can transmit all sounds provided by AV equipment
- Requires a 19 inch rack mount or similar space
- 220V, 3 Pin Grounded Power plug.



# Loop system Operation

## Hardware

- Hearing Loop, Loop driver and PA system installed and connected to each other

## Operator responsibility

- Switch on Amplifier and Loop Driver

## Hearing impaired visitor

- Switches own hearing aid to T or MT position
- Hears all signals at personal appropriate level





# Assistive Technology for Hearing Impaired Product Comparison

	<b>Personal or Semi Fixed FM Systems</b>	<b>Perimeter Loop</b>	<b>Low Spill Loop</b>
Installation	Mobile/ Partial	Fixed	Fixed
Maintenance	Cleaning/Testing/Consumables	Minimal	Minimal
Staff involvement	Very high	Minimal	Minimal
Visitor ease of use	Complicated	Easy	Easy
Judge Involvement	Yes	None	None
Discreet use	Not discreet	Discreet	Discreet
Privacy	High	Low	High
Several speakers	Limited	Unlimited	Unlimited
Running Cost	High	Very low	Very low
Equipment/Setup Cost	Medium	Low	High