

Beyond the Noise Sound Masking for Integrators

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2019 BICSI Winter Conference & Exhibition

January 20-24 • Orlando, FL, USA



Sound Masking Opportunity for Integrators



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Opportunity

- According to the US Energy Administration in 2012, there was 87 billion square feet of “commercial building space” in the USA alone.
- “Commercial office space” made up 18% of that 87 billion for a total of 15.6 billion square feet.
- Annual growth of “commercial office space” is estimated at 1% increase in sq ft. year over year.
- CSM estimates that approximately only 2% of the commercial office space in the United States has currently has some form of sound masking installed.
- Many of these clients already purchase other technologies from AV / ICT providers.



Opportunity for Integrators

- With an installed cost range of \$1 to \$2 per sq ft. The potential sound masking market opportunity in the USA is estimated to be between \$15.3 to \$30.6 billion dollars for integrators. (as of 2012)
- Accounting only for a 1% annual increases in square foot of commercial office space, this opportunity grows between \$150 to \$300 million dollars each year.
- Additional opportunities exist in health care, education, lodging and public safety facilities as well as office space world wide.
- Sound masking growth for CSM dealer partners ranges between 35% to 40% annually over the past several years as demand for sound masking continues to increase.



Why Partner with CSM?



Qt**PRO**™ Dynasound**PRO**™

- CSM works exclusively with dealer channel partners. (no direct selling to end users).
- CSM partners have access to the widest range of product offerings including patented technologies to meet virtually any sound masking application.
- CSM is the world leader in sound masking technologies.
- Exclusivity of support services from design, sales, application support, & system commissioning services.

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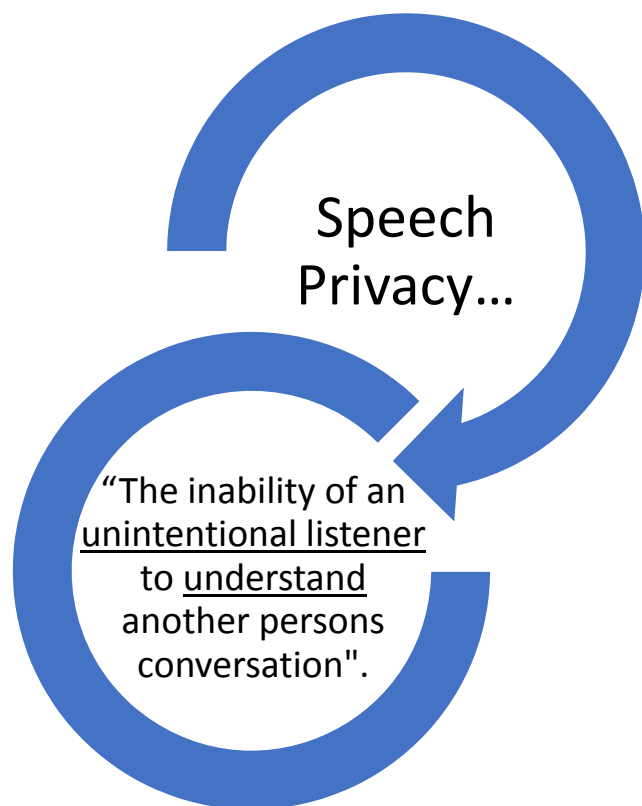
The Need for Speech Privacy



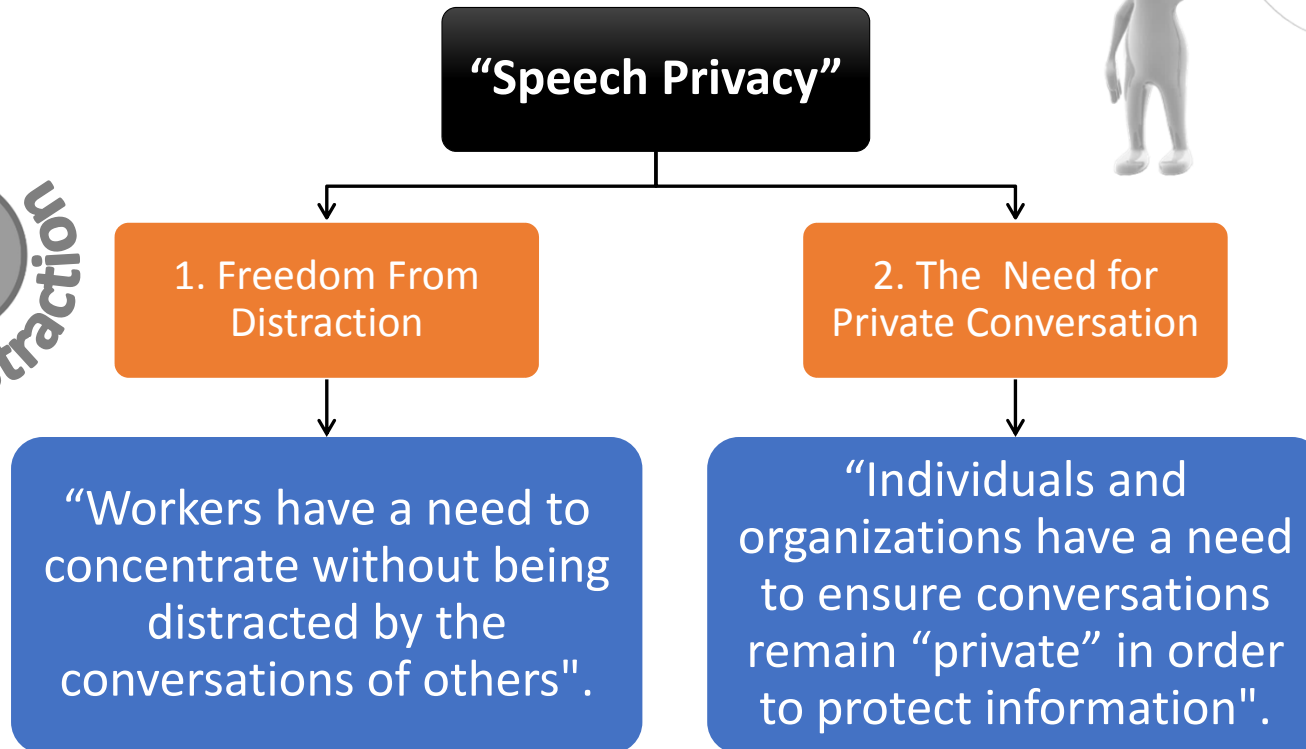
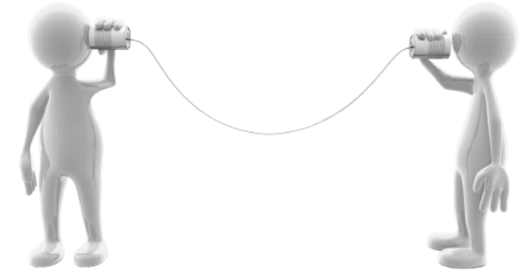
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Definition of Speech Privacy



Speech Privacy Categories



Freedom From Distraction

Modern architecture trends in the workplace has lead to much distraction due to “open plan environments”, “benching”, “hoteling” and the need for “daylighting”.



“Workplace trends, while offering many benefits, can also often lead to distraction of the workforce through lack of speech privacy”.



Freedom From Distraction

As humans we unintentionally listen to conversations which take place nearby, when that conversation can be easily understood.

By nature, humans are predisposed to listen to others in order to communicate effectively.



“When unwanted conversations are intelligible, the brain processes the overheard conversation thus leading to distraction”.



Freedom From Distraction

The “loudness” of human speech has less to do with the amount of distraction, but rather it is the level of intelligibility in which that conversation is comprised that distracts.



“It is sometimes simpler to concentrate in noisy environments due to the fact speech is more difficult to clearly understand”.

“The human brain can more easily “tunes out” unintelligible conversations”.

The Effects of Poor Speech Privacy

Lost
Time



Up to 21 Minutes
Per Day

Lost
Money



Approx. 80 Hours
Lost Per Year per
Worker

Unhappy
Workers

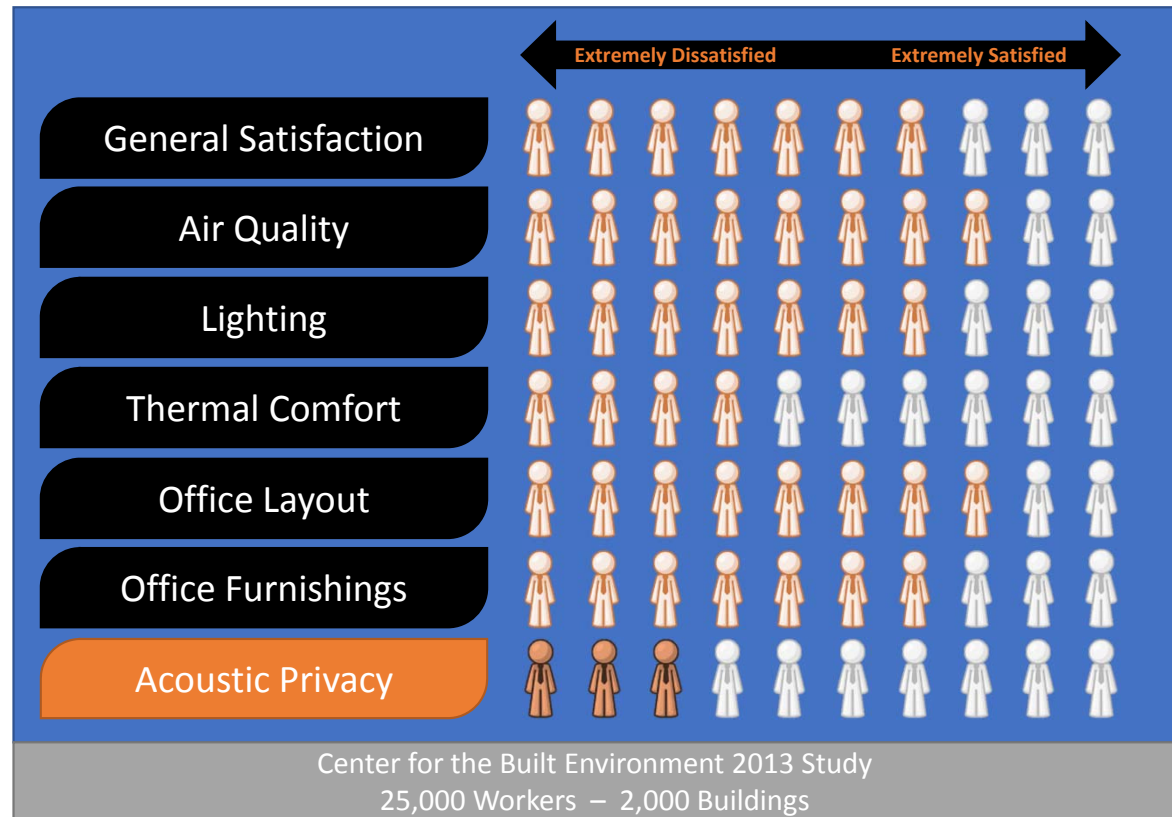


Due to Lack of
Concentration

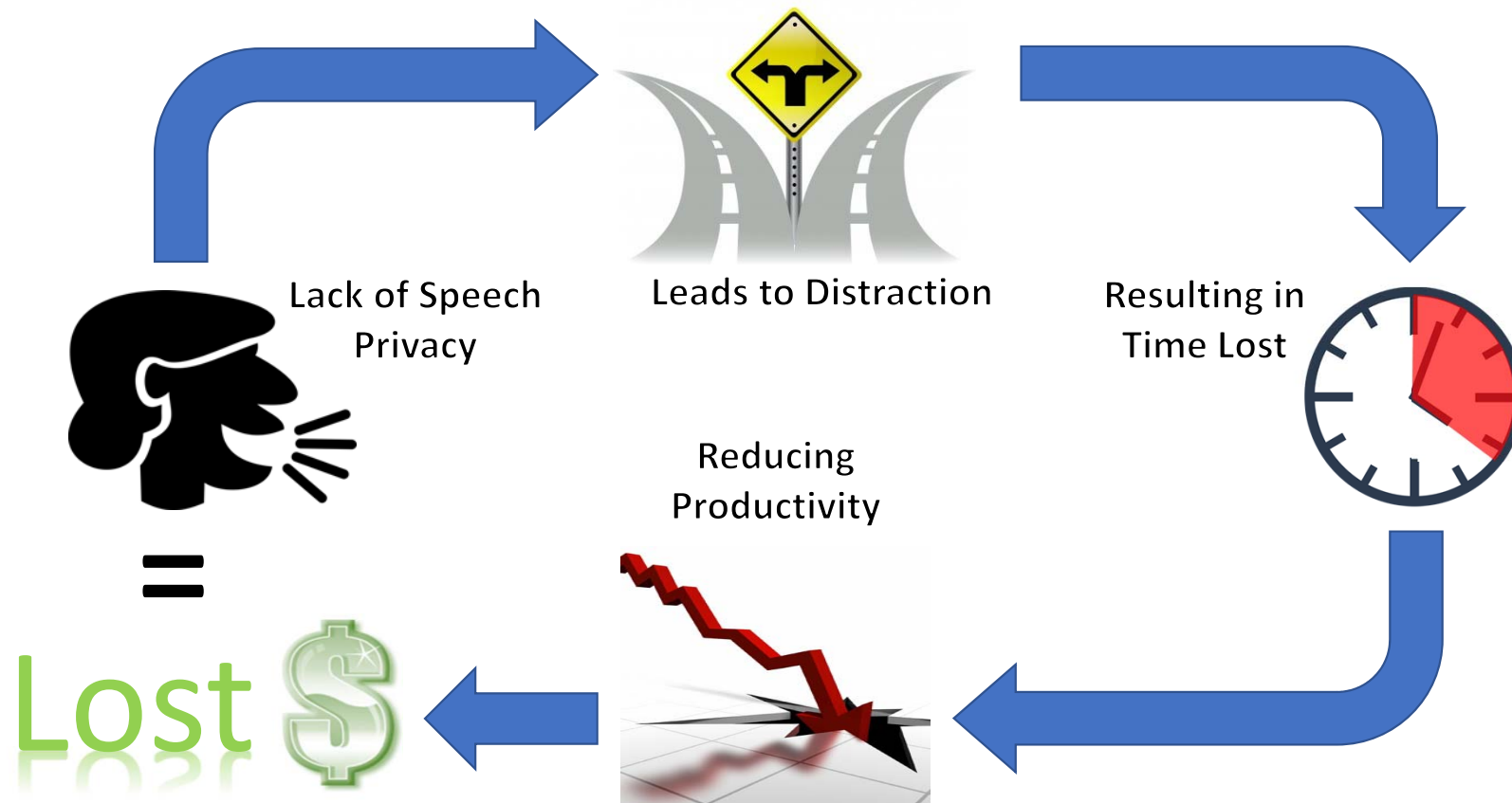


Worker Complaints Due to Distraction

- Inability to focus on time sensitive tasks.
- Frustration with chatty / loud coworkers.
- Dissatisfaction with the working environment.



Why Employers Care



Private Conversations

In many cases conversations need to remain confidential to protect the private information of others. Such examples include “account information”, “human resources”, and “patient privacy”.



“Private conversations between a doctor and patient can often be easily overheard in adjacent spaces due to lack of speech privacy”.



Private Conversations

Privacy laws such as “HIPAA”, “GLBA”, “PIPA”, and “FERPA” often protect private information respectively in the healthcare, financial, and education sectors. Many such conversations need to remain confidential to protect a persons privacy.



“Certain industries / organizations may have a potential liability exposure should confidential information be overheard”.



Private Conversations

Even in cases where privacy law does not mandate confidentiality, virtually every company has a need for speech privacy within their operation.



“Meeting spaces used for discussions surrounding either human resources or strategic planning often have a necessity for private conversations to take place”.



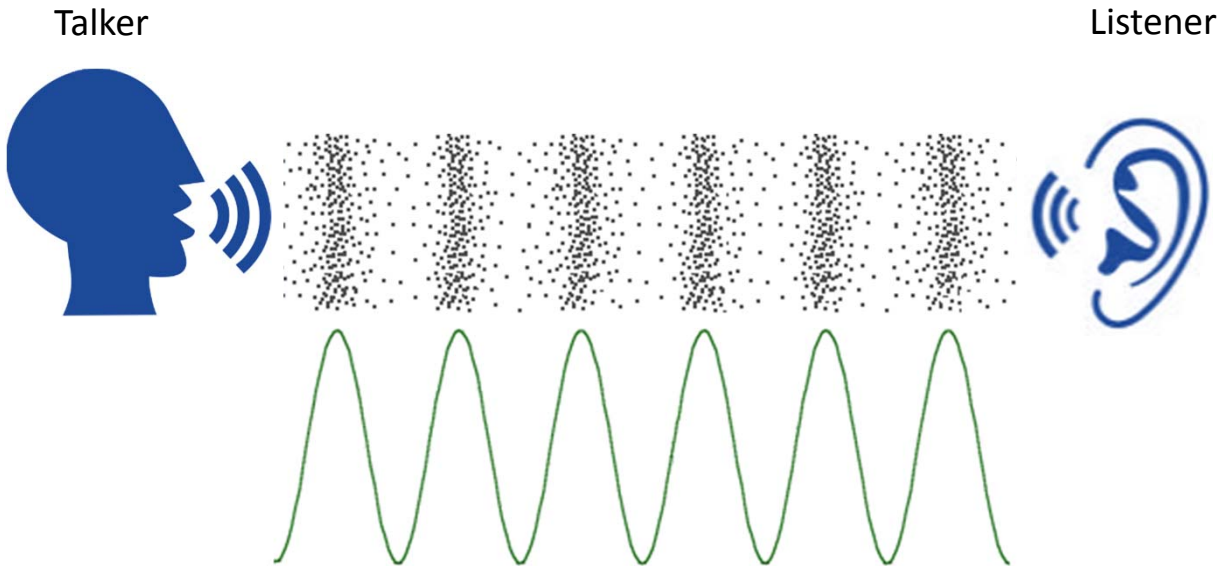
The Acoustic Principles Behind Speech Privacy



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Sound Transmission in Materials



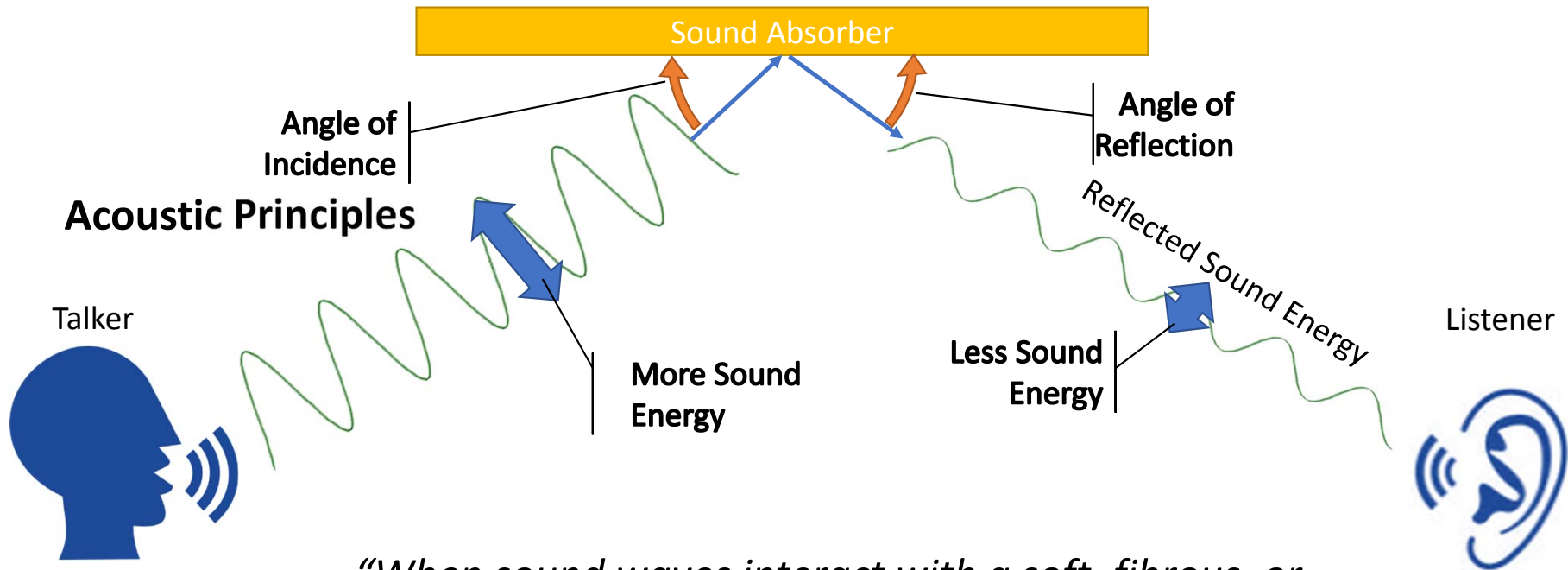
"The transmission of sound through air and other materials occurs through the vibration of molecules in a pattern called waves to transmit an audible signal".

The A,B,C,D's of Architectural Acoustics

- **A**bsorption
- **B**locking
- **C**overing
- **D**istance



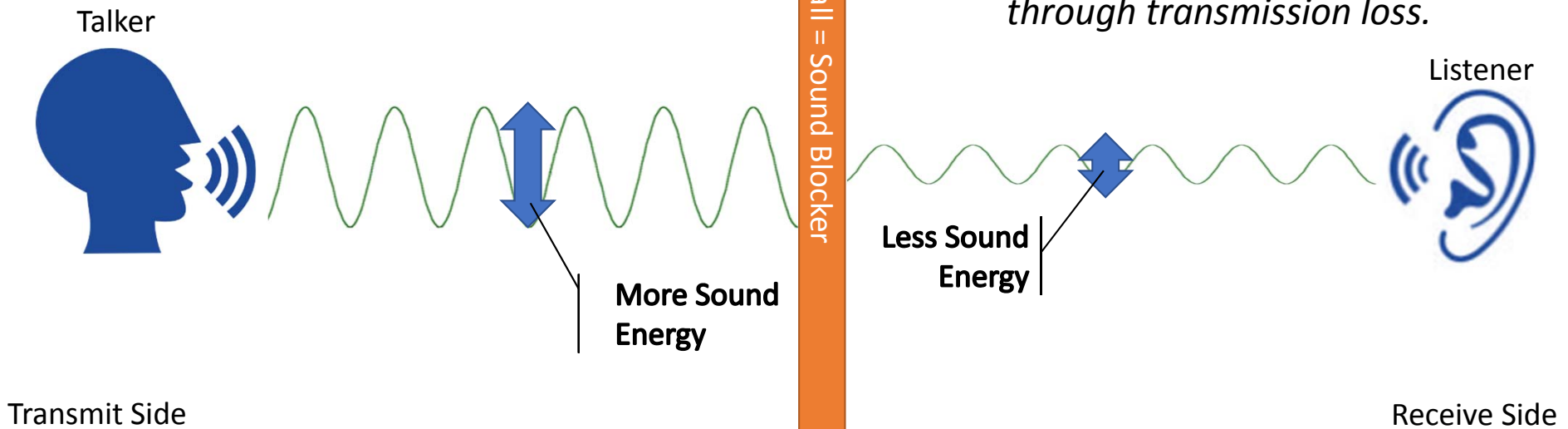
Absorption = Noise Reduction Coefficient (NRC)



"When sound waves interact with a soft, fibrous, or porous surface, much of the sound energy is absorbed (dissipated through energy transfer). The remaining sound energy is reflected back to the listener".

Blocking = Sound Transmission Class (STC)

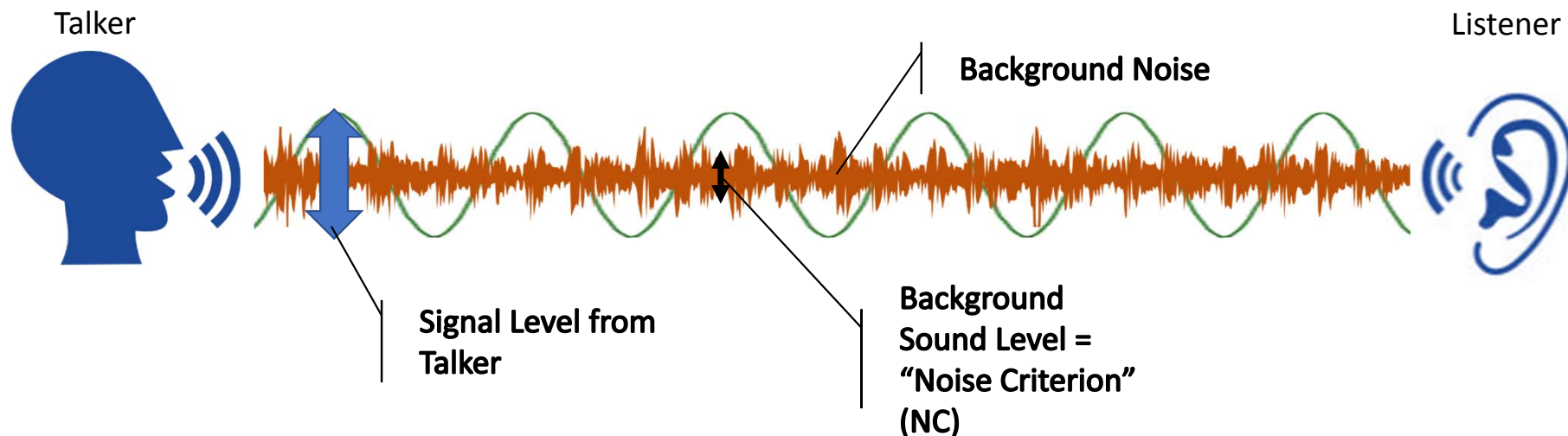
Acoustic Principles



Assemblies such as walls have the potential to block (or contain) sound. However, some sound energy escapes from the transmit side of the boundary to the receive side. This is the sound transmission rate of the material(s). STC is used to rate the amount of sound energy an assembly blocks through transmission loss.

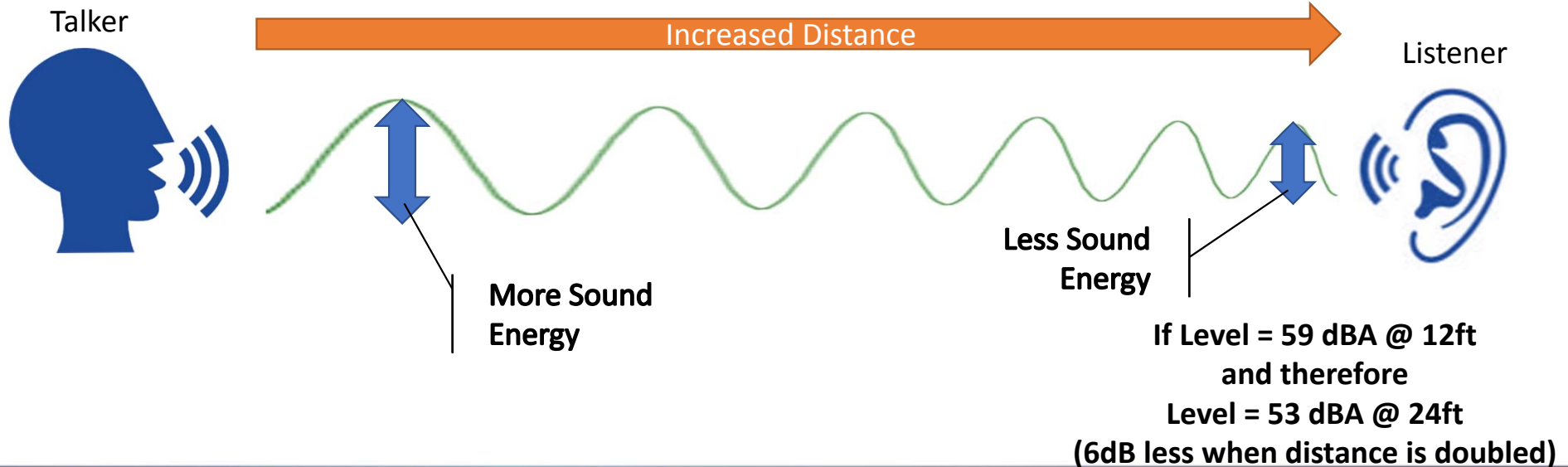
Covering = Noise Criterion (NC)

Sound waves can be covered up (masked) by other “noises” in an environment such as sounds generated by a sound masking system. The level of the background noise is often defined as the Noise Criterion Curve (NC) and can be described in lay terms as the “ambient sound level” found in a space. The higher in level the ambient, (NC), the more difficult speech intelligibility is to obtain in most circumstances.



Distance = Inverse Square Law

“Sound waves decrease in energy (attenuate) due to distance. This rate of attenuation equals 6 decibels (6dB) per doubling of the distance from the talker to listener is known as “inverse square law”. This explains why it is difficult to understand conversations from a great distance”.



Why Modern Architecture is Driving the Need for Sound Masking Systems

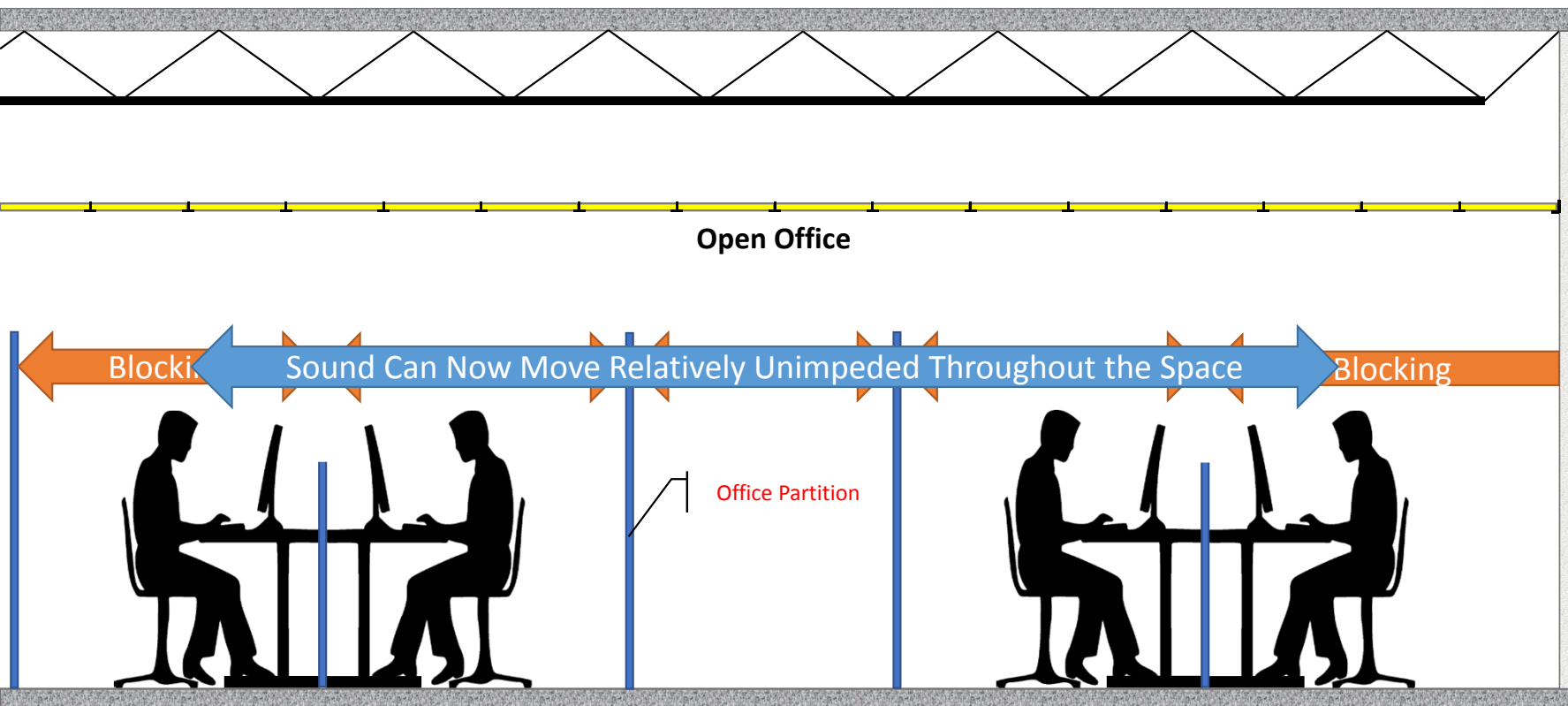


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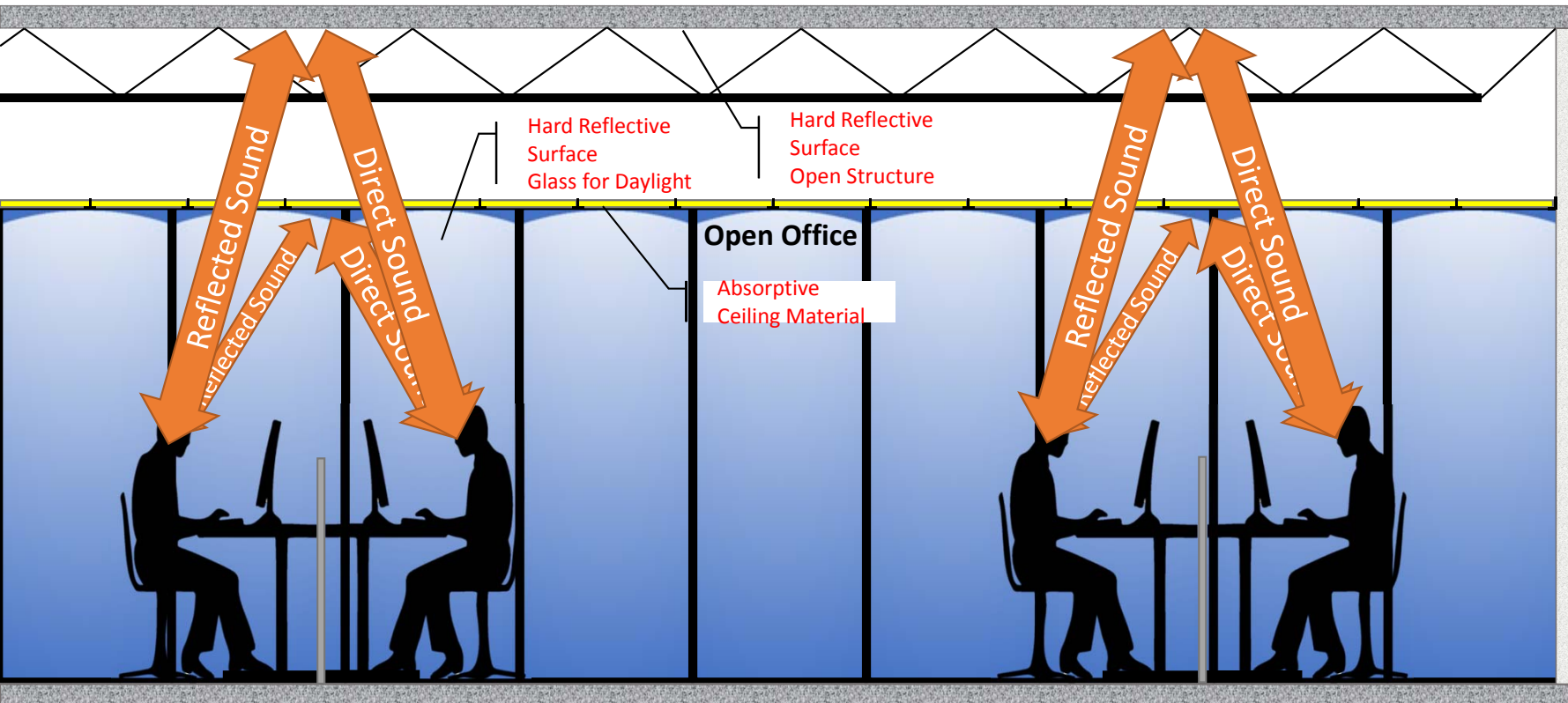
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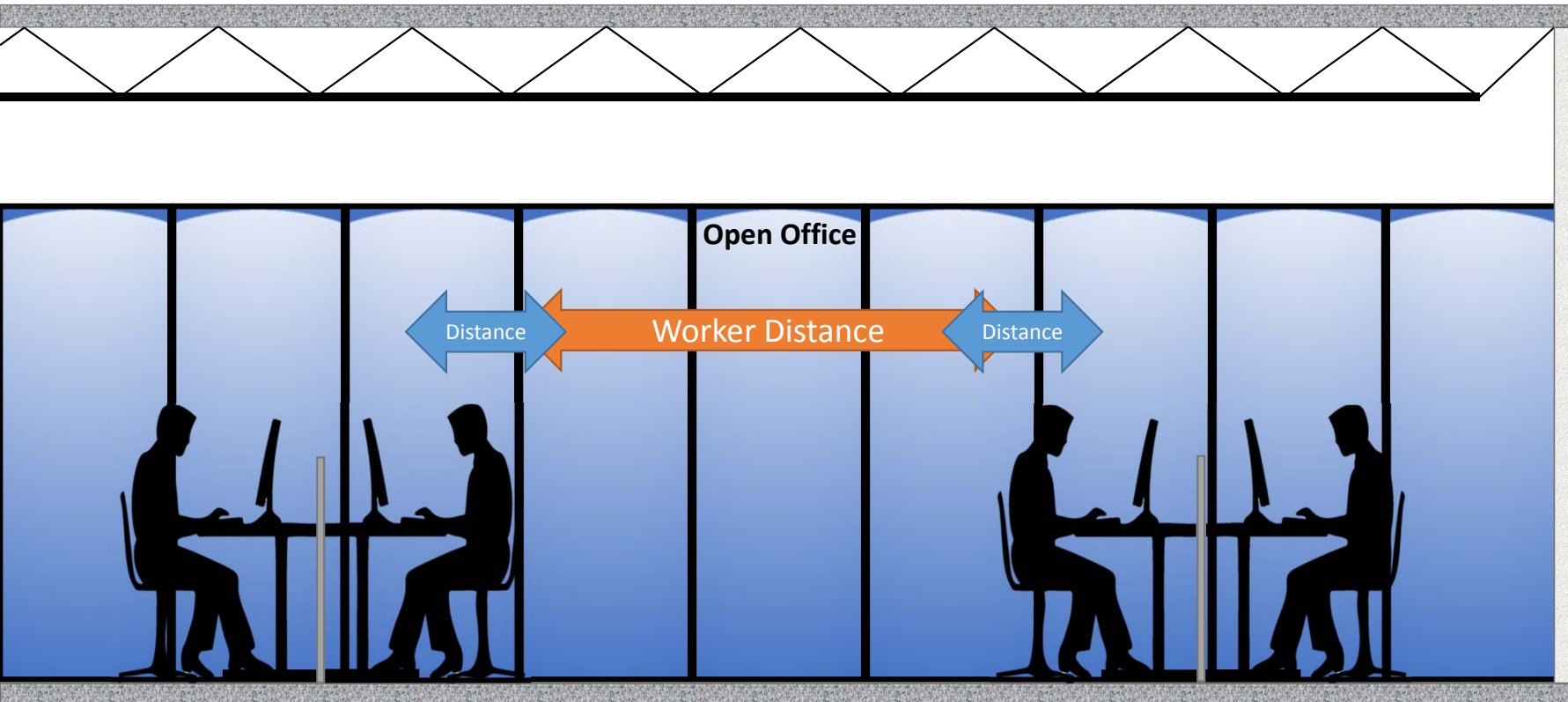
Lowered Partition Heights (Less Blocking)



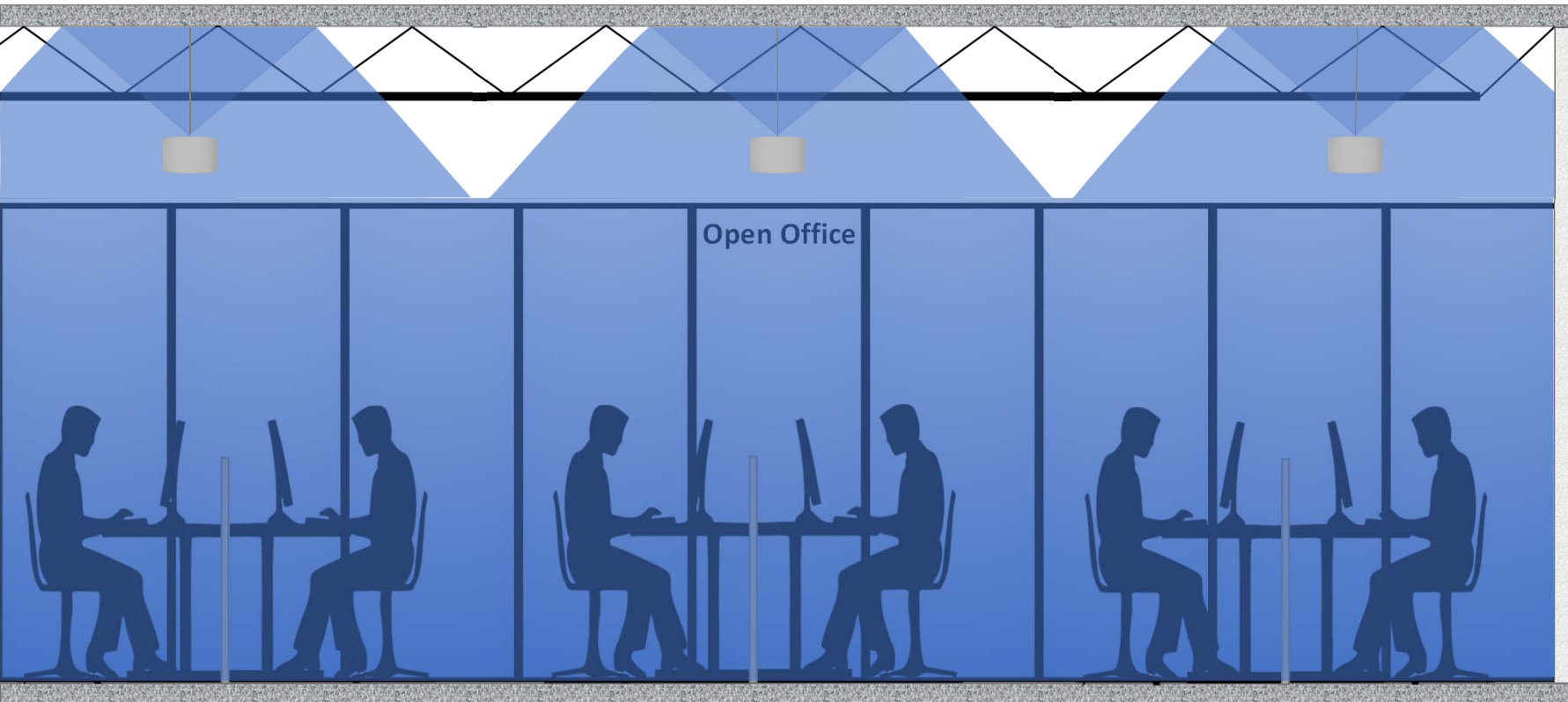
Changes in Materials (Less Absorption)



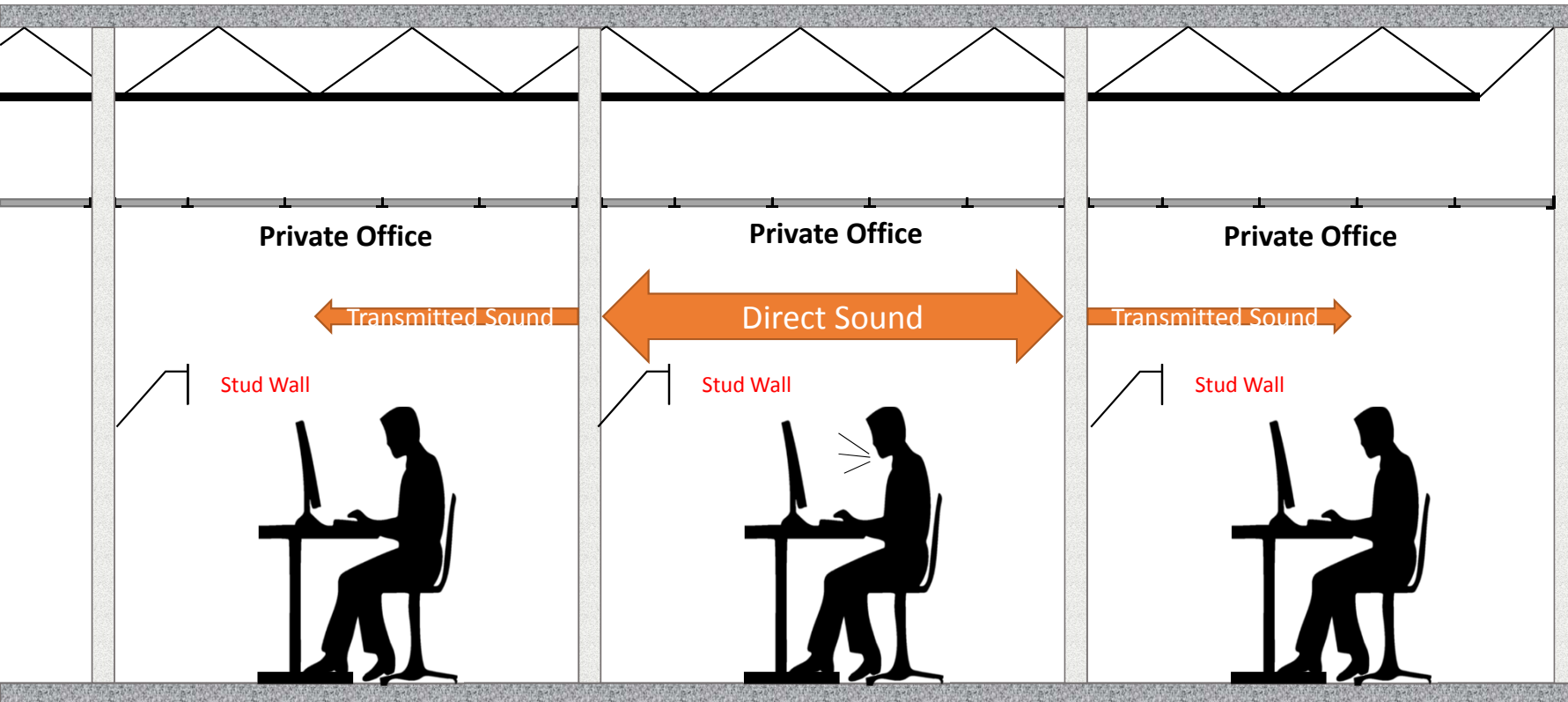
Worker Density (Less Distance)



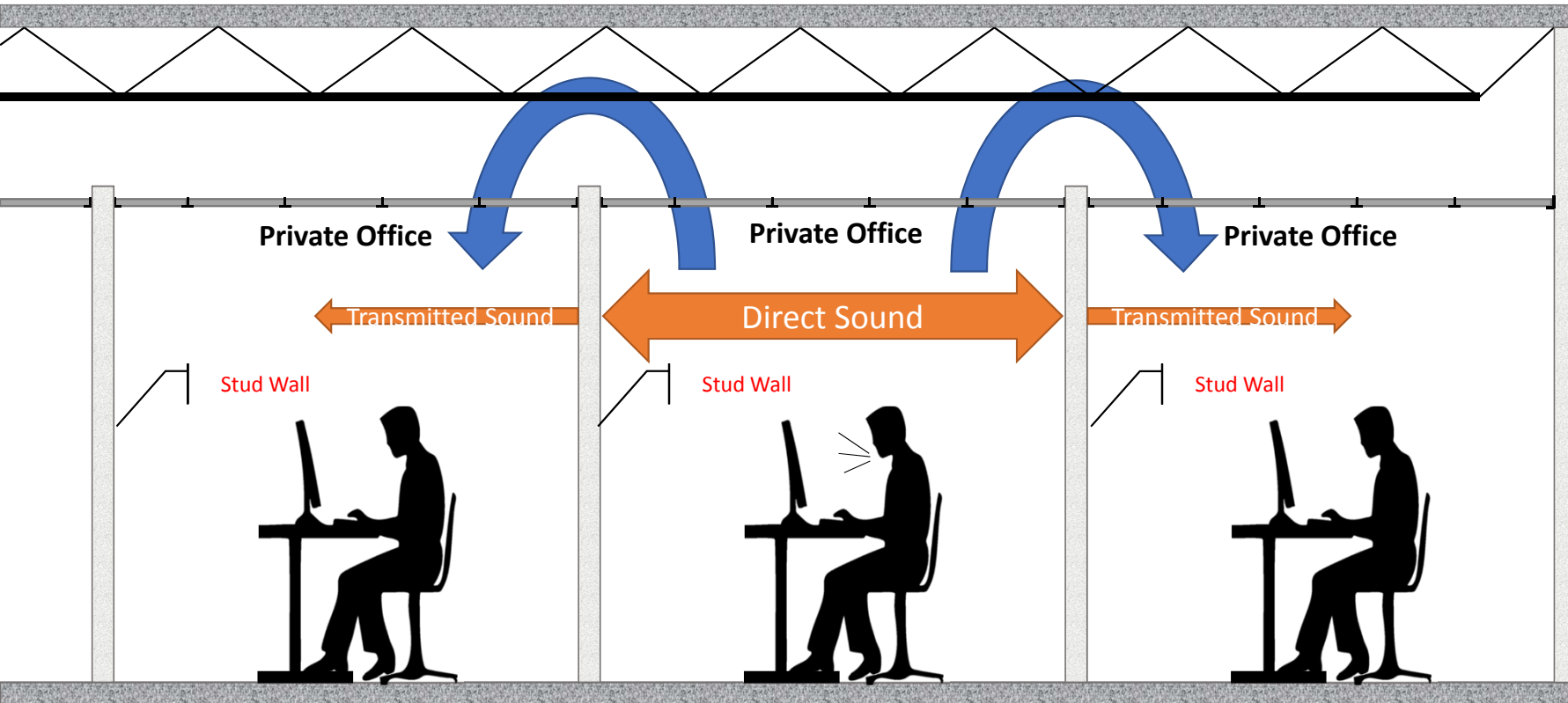
Sound Masking (More Covering)



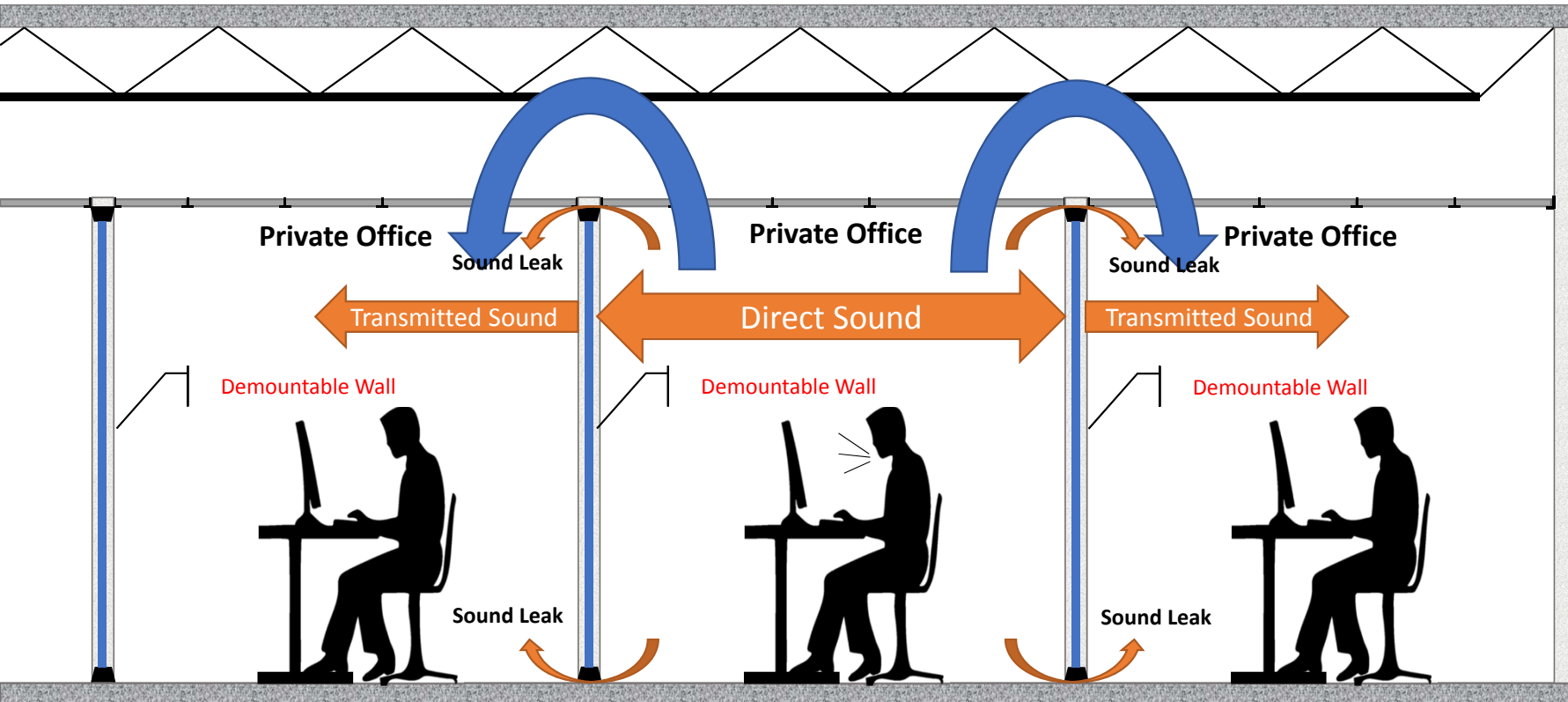
Sound Transmission (Blocking)



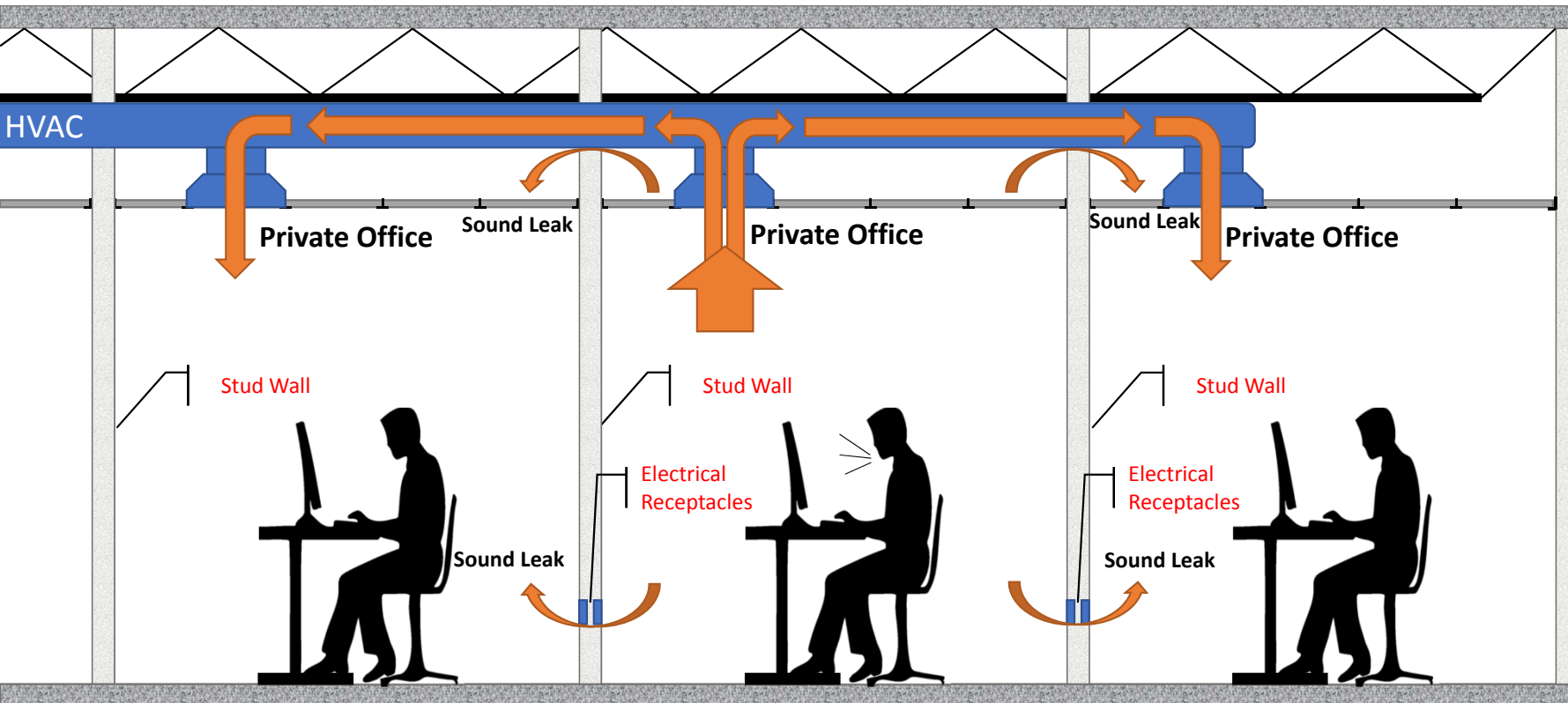
Sound Flanking (Plenum Transfer)



Sound Transmission (Demountable Walls)



System Penetrations (Duct Transfer)



How Sound Masking Works



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Sound Masking

Sound Masking is the addition of a specifically tailored low level electronic & constant sound to an environment which lowers the signal to noise ratio of a talker, thus providing “speech privacy”. -

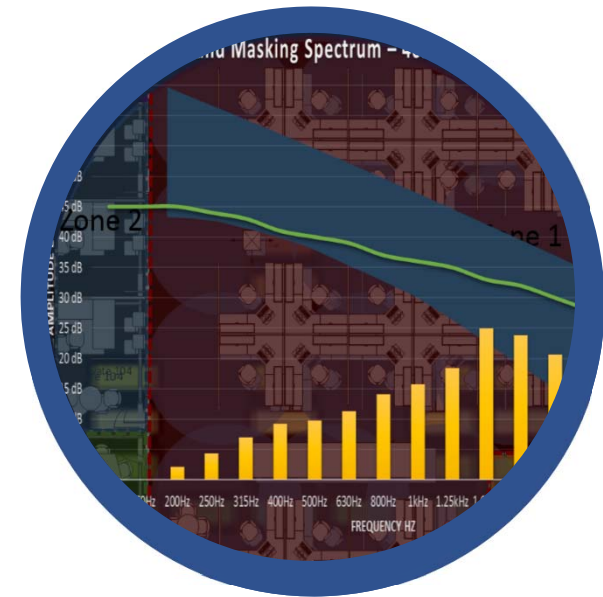
Sound masking is effective when placed at the unintentional listener location by lowering the level of “speech intelligibility” of the talkers signal.



Effective Sound Masking

Four Keys to Effective Sound Masking

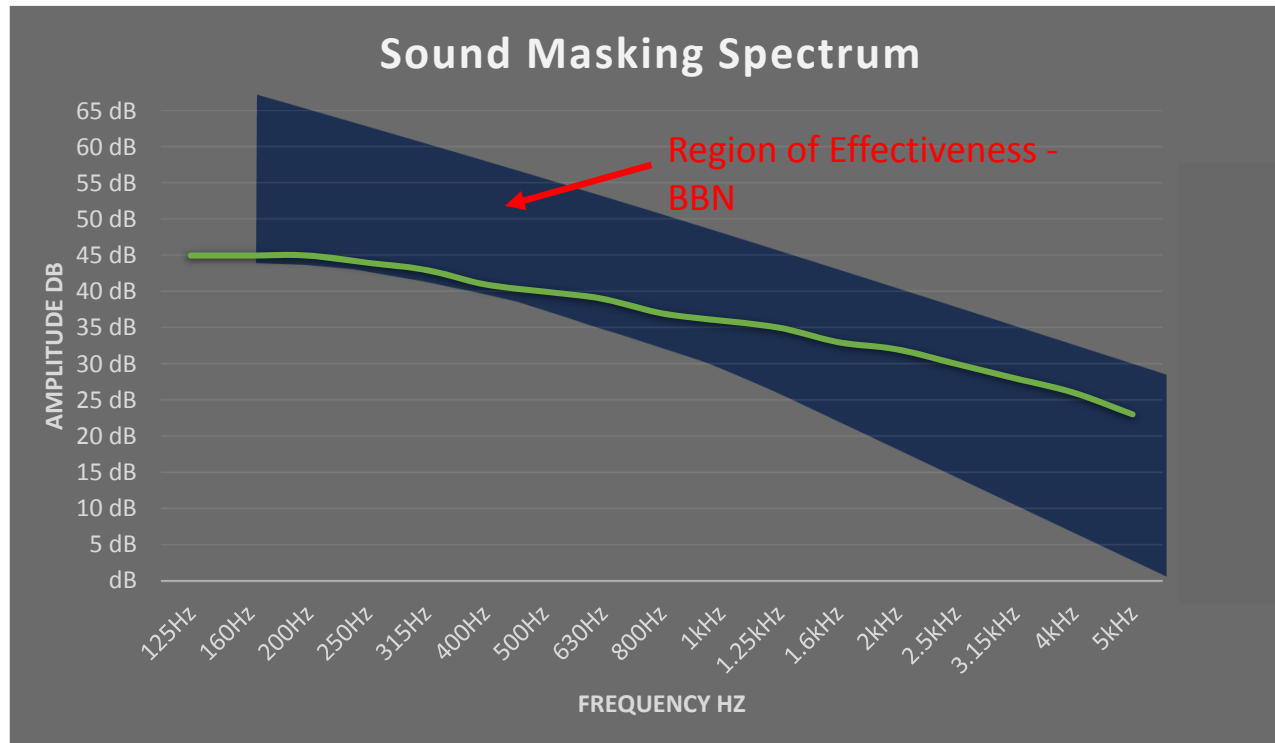
1. Must be an extremely uniform distribution of a constant sound spectrum (+/-1dB Spatial / Spectral Uniformity) which provided by a evenly spaced grid of loudspeakers or sound masking emitters.
2. Granular level adjustment of each “Zone” based on space functionality, client’s controllability needs, and paging requirements if any.
3. Is adjusted to utilize a specific frequency spectrum of non repeating sounds consisting of the same frequency content found in human speech.
4. Must be unobtrusive and not contain any discernable information.



Sound Masking Levels



Sound Masking Spectrum

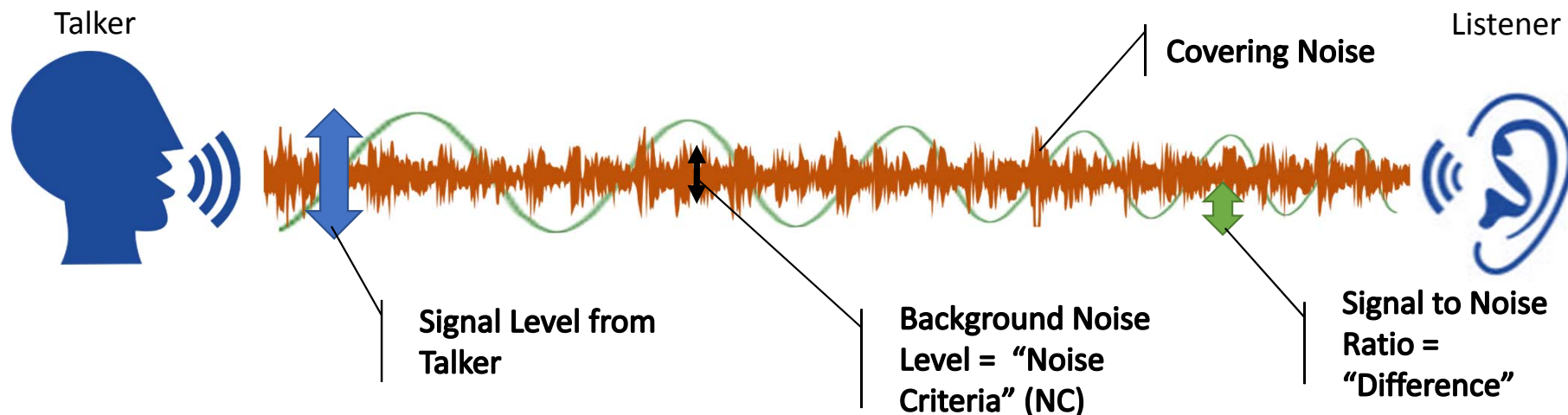


- “Sound Spectrum Region of Effectiveness” as determined by Leo Beranek of the Cambridge, MA firm Bolt, Beranek, Newman (BBN).
- A sound masking noise spectrum must balance providing “Speech Privacy” with “Occupant Comfort”.
- Goal = Minimize changes in frequency spectrum throughout an space. Spectral uniformity (consistency of the frequency spectrum) is paramount to sound masking.



Signal to Noise Ratio (SNR)

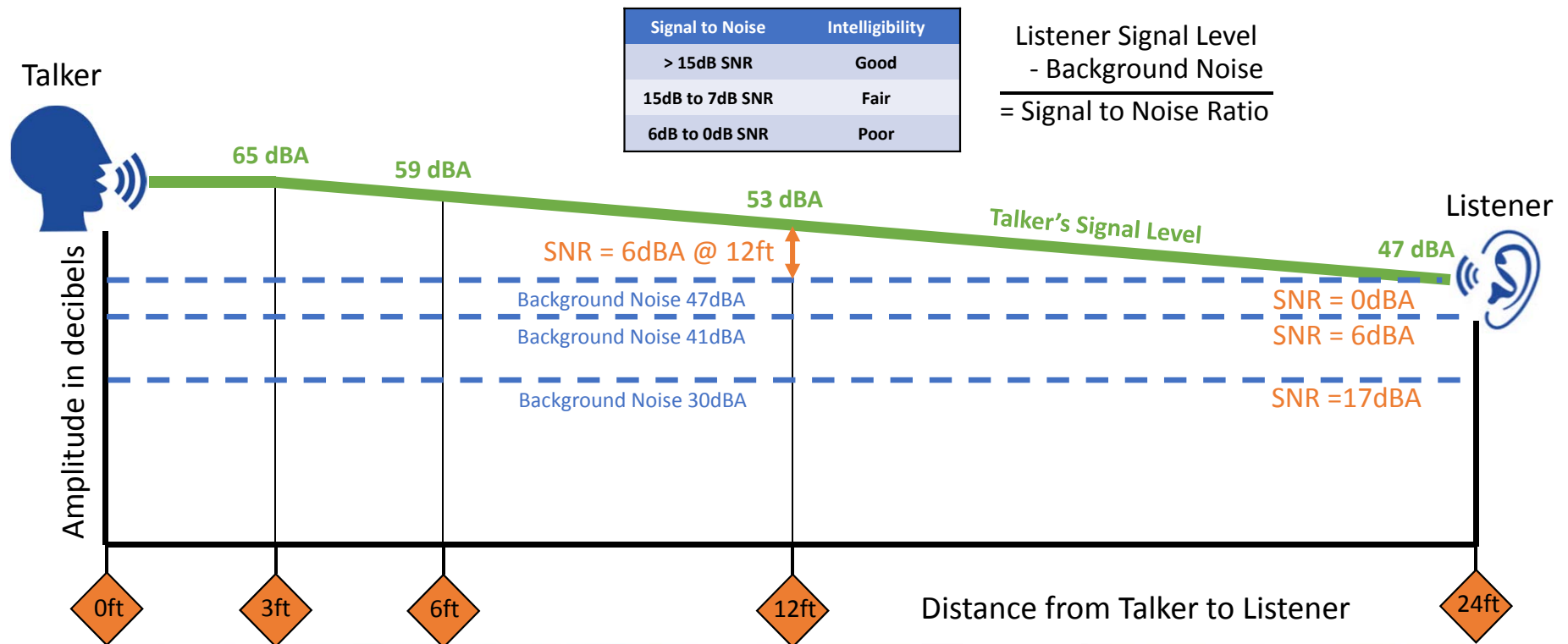
The difference between the “background noise level” (NC) and the “signal level” from the talker is defined as the “Signal to Noise Ratio” (SNR). The larger the SNR – the clearer the talker’s signal. The smaller the SNR – the more difficult it is to obtain intelligibility from the speech signal.



Larger Signal to Noise = Good Speech Intelligibility -vs- Small Signal to Noise Ratio = Poor Speech Intelligibility

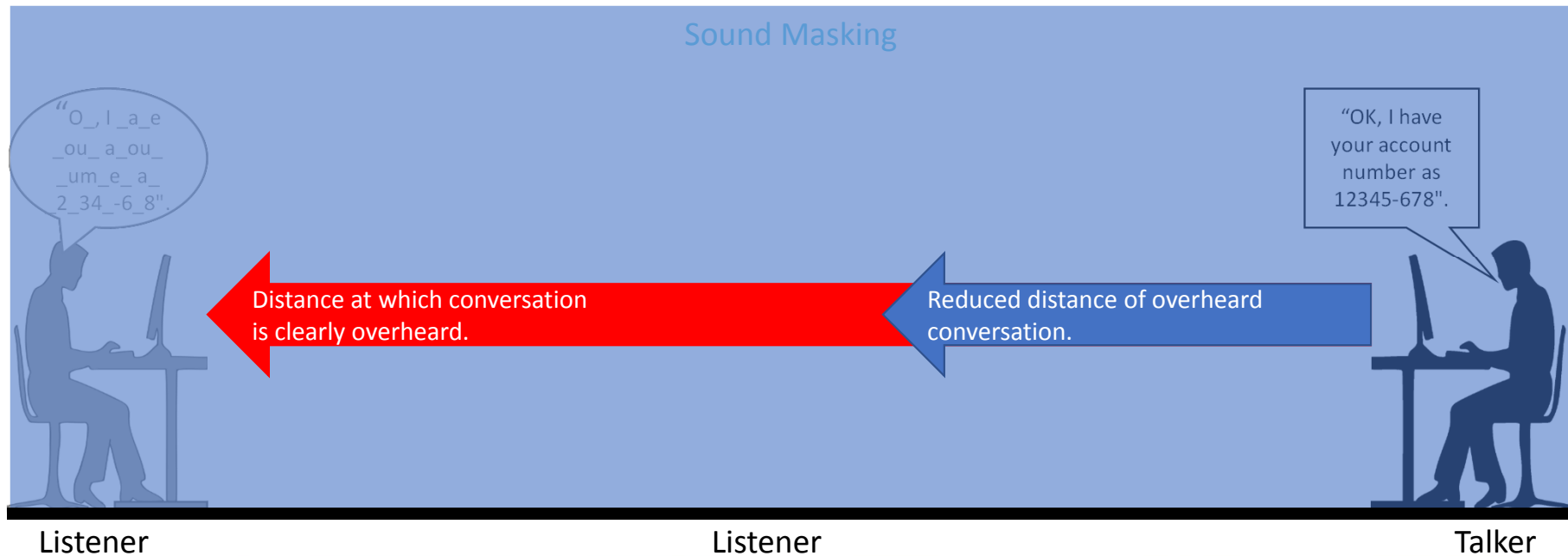
Signal to Noise Ratio (SNR)

The "Signal to Noise Ratio" is calculated by subtracting the signal level as received at the listener location from the background noise level present.



Reducing Conversational Distances

“By deploying sound masking, (i.e. reducing SNR) the distance at which intelligible conversations are overheard is greatly reduced leading to better speech privacy”.

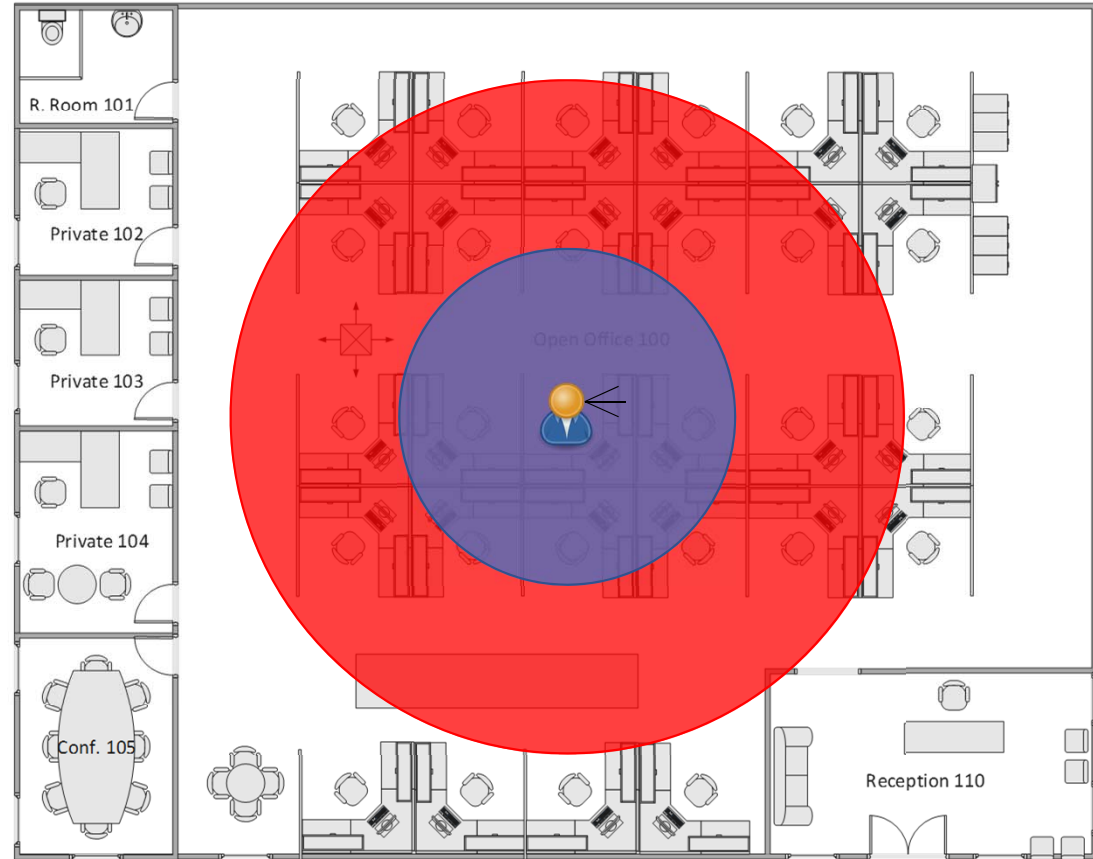


Sound Masking



The Radius of Distraction

- The areas at which a persons conversation is “clearly intelligible” known as the “radius of distraction”. (shown in red)
- The addition of Sound masking lowers the signal to noise ratio thus reduces the radius of distraction. (shown in blue)
- The actual distances where intelligibility can occur will vary based on the acoustic conditions (absorption and blocking) within the space, including the furnishings.



Types of Sound Masking Systems



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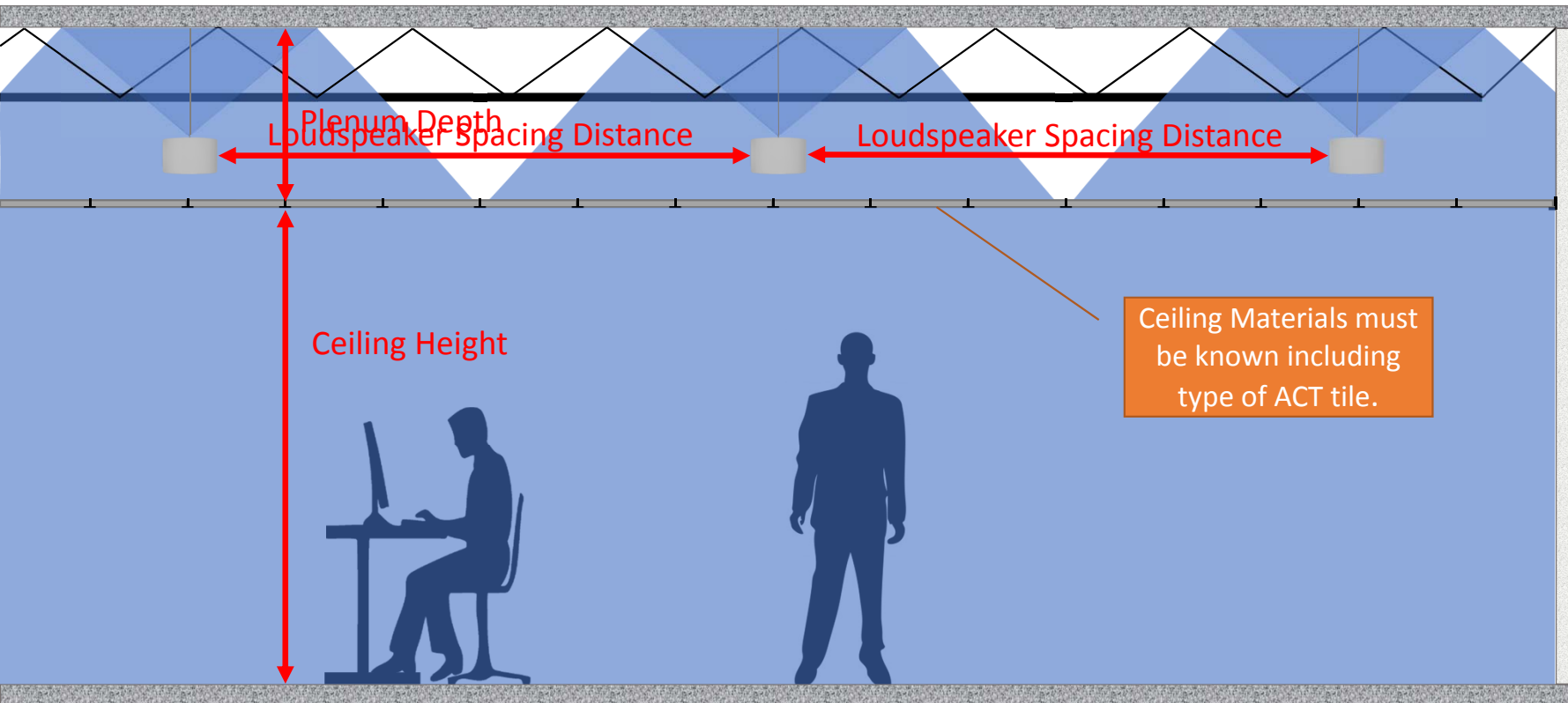
Differing Types of Sound Masking

Basic Types for Discussion

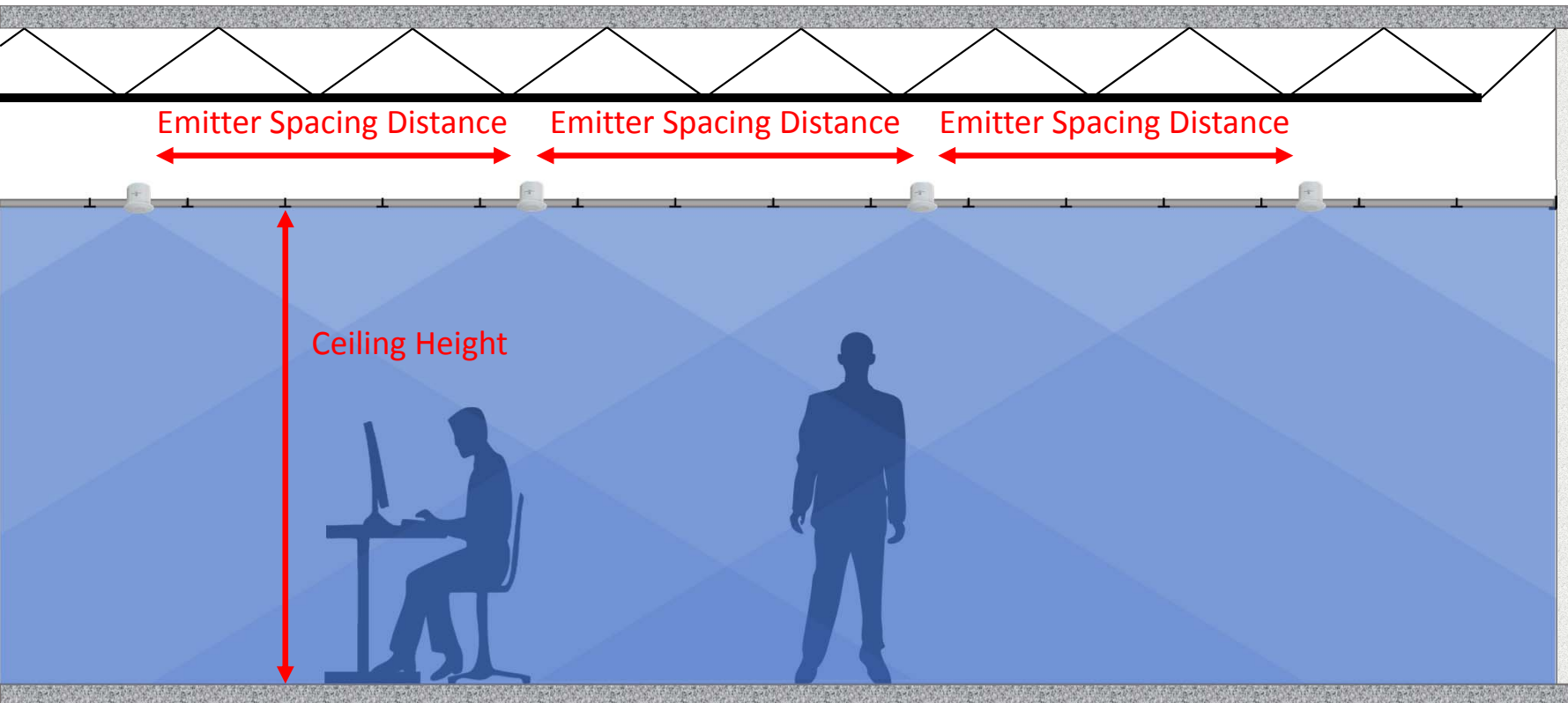
- In Plenum (Indirect)
 - 70 Volt Systems
 - Network Systems
- In Ceiling (Direct Field)
- Under Floor (Indirect)



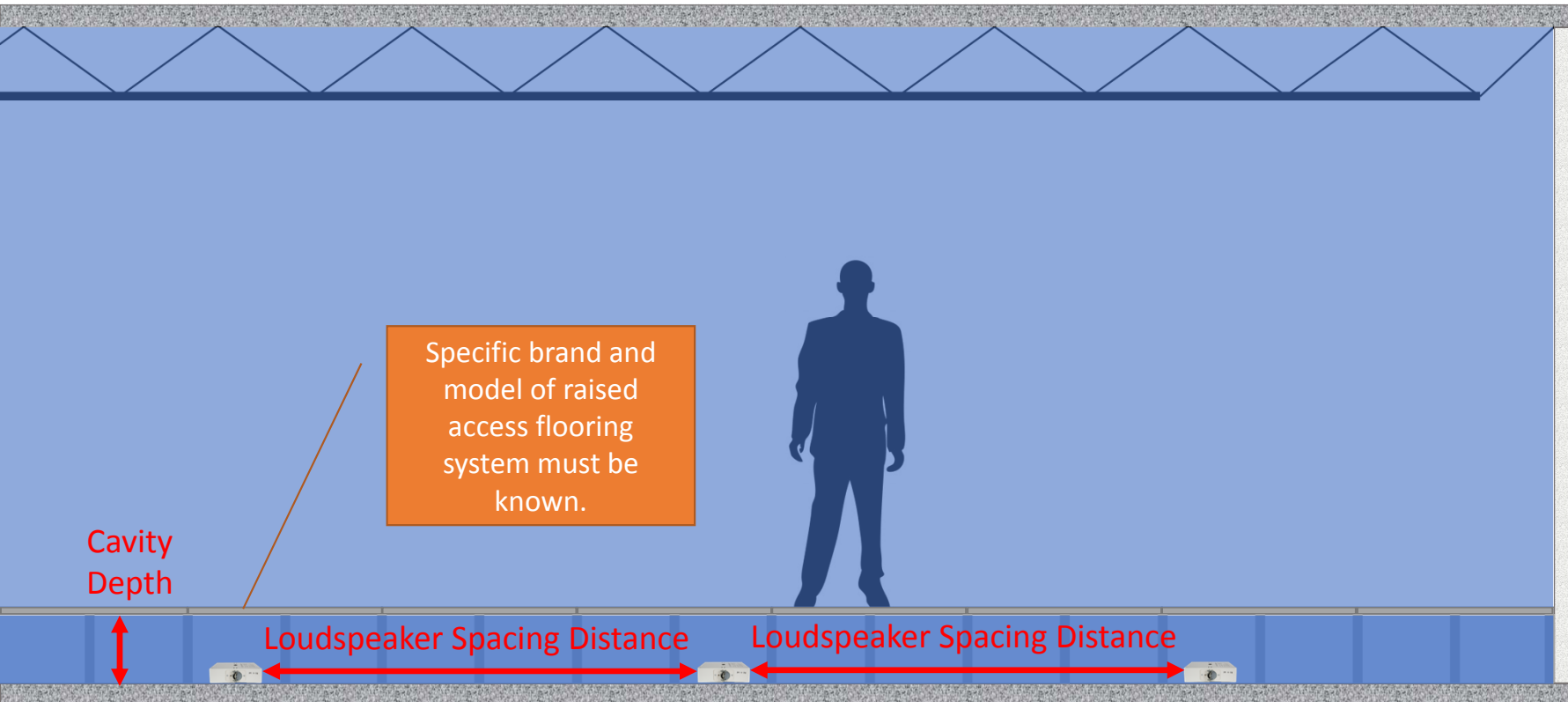
Plenum (Indirect)



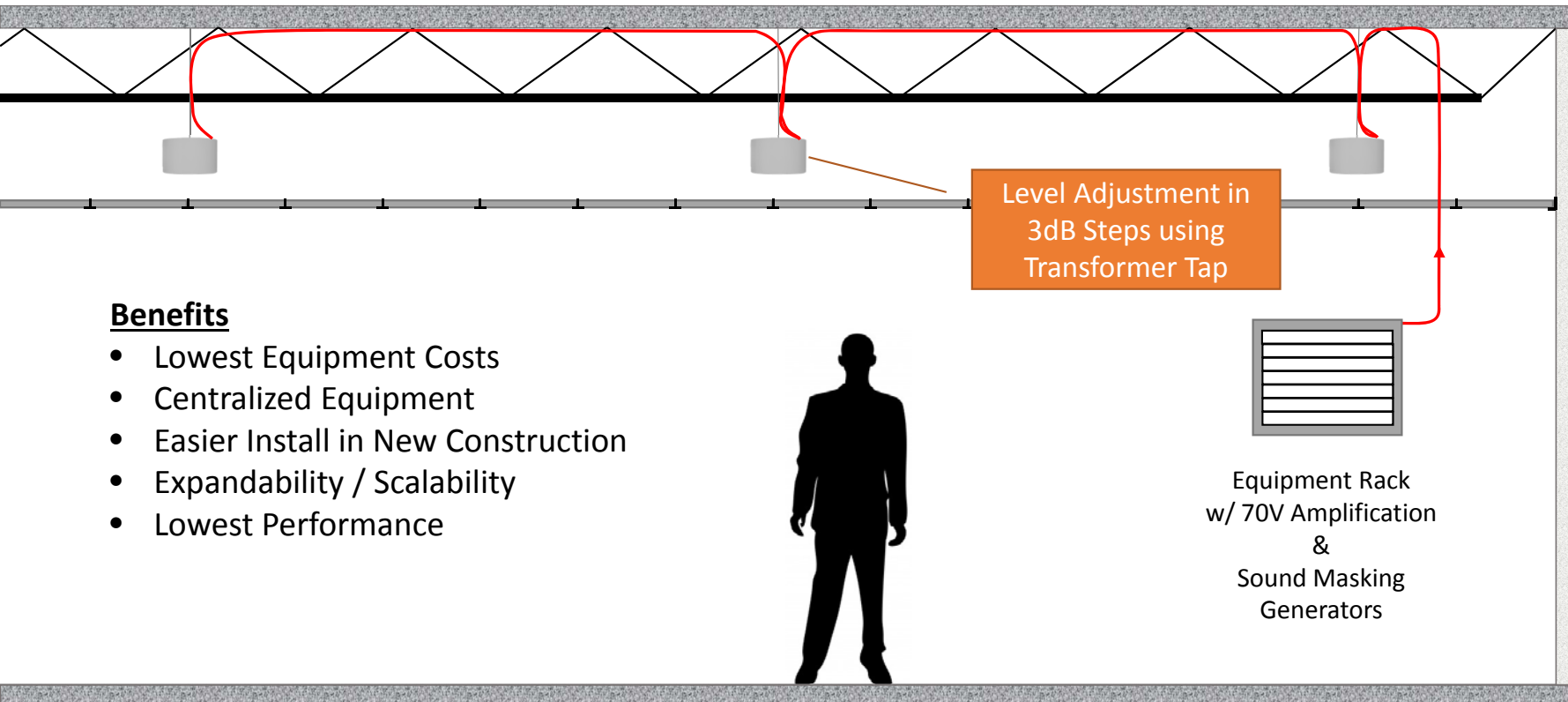
In Ceiling (Direct Field)



Under Floor (Indirect)



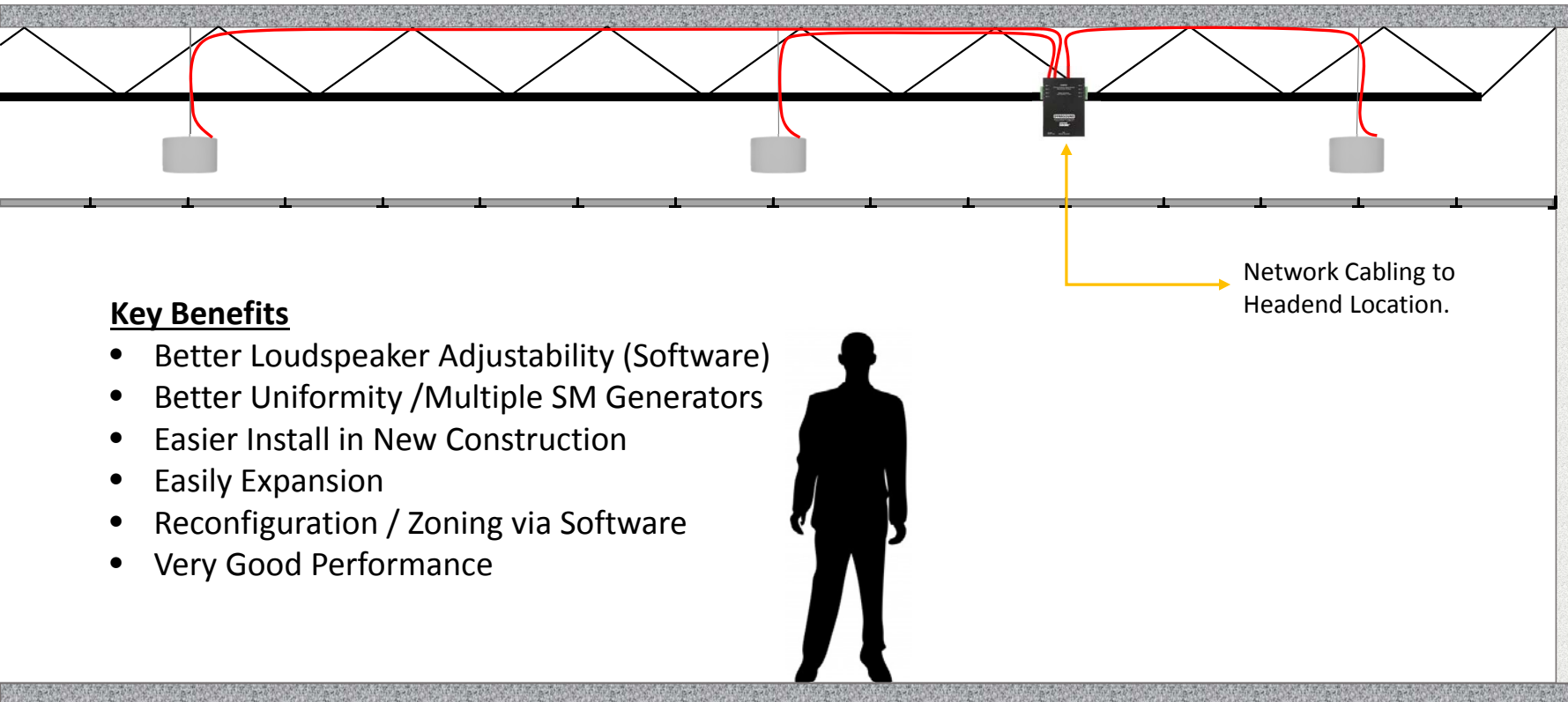
Plenum 70V (Indirect)



Benefits

- Lowest Equipment Costs
- Centralized Equipment
- Easier Install in New Construction
- Expandability / Scalability
- Lowest Performance

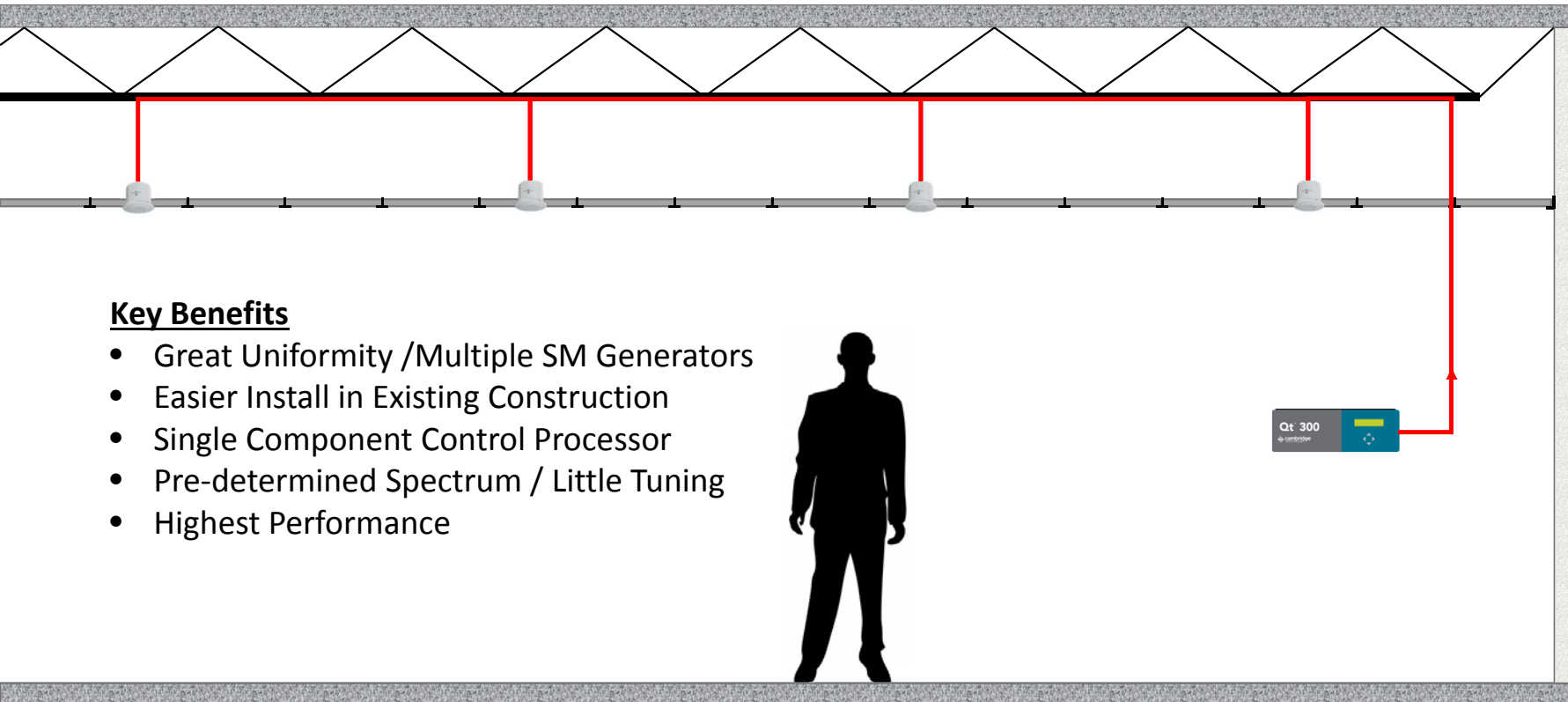
Plenum Network (Indirect)



Key Benefits

- Better Loudspeaker Adjustability (Software)
- Better Uniformity /Multiple SM Generators
- Easier Install in New Construction
- Easily Expansion
- Reconfiguration / Zoning via Software
- Very Good Performance

In Ceiling (Direct Field)



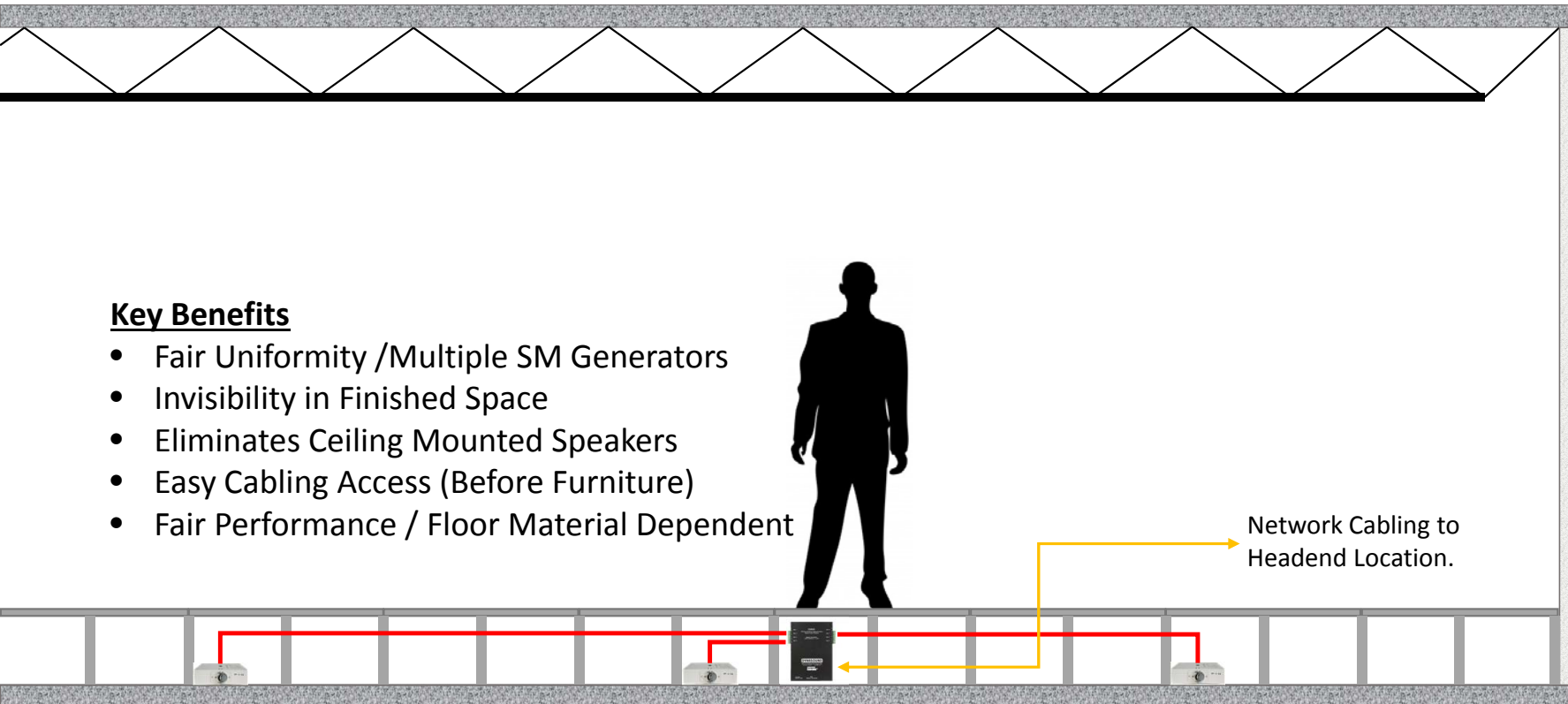
Key Benefits

- Great Uniformity / Multiple SM Generators
- Easier Install in Existing Construction
- Single Component Control Processor
- Pre-determined Spectrum / Little Tuning
- Highest Performance

Under Floor (Indirect)

Key Benefits

- Fair Uniformity / Multiple SM Generators
- Invisibility in Finished Space
- Eliminates Ceiling Mounted Speakers
- Easy Cabling Access (Before Furniture)
- Fair Performance / Floor Material Dependent



Network Cabling to
Headend Location.



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Tips for Successful Integrators

- Collecting good project data will help determine the best sound masking approach to take. CSM is here to help you make a good system decision based on project specifics.
- Setting client expectations as to what sound masking can do to benefit their environment is very important.
 - Explain the Radius of Distraction
- A scientific (not a subjective) approach should be used for all sound masking systems.
 - Ensure excellent uniformity (+/- 1dB) – Generally determined by the design /architecture.
 - Make sure sound masking levels are spot on for each area served.
 - Use precise acoustic measurement tools and procedures – Levels / Spectrum
- Demo systems and demo kits are a great way for clients to understand how masking really works through first hand experience.
 - Demo Systems / Demo Kits are available.



Wrap Up



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Speech Privacy

- The “Speech Privacy Crisis” in the working environments has reached critical mass driven by changes in architecture and furnishings due to the reduction in the amount “Absorption” , “Blocking”, and decreased “Distance” between workers.
- Companies are losing productivity due the lack of Speech Privacy present in the workplace.
 - Making workers unhappy with their work environment
 - Presents potential liability risks
 - Costing them money
- By promoting sound masking, you can offer your clients a solution to these speech privacy issues with a very short ROI.



Sound Masking Solves Privacy Concerns

- Sound masking helps to restore reasonable levels of speech privacy in many environments.
- When absorption, blocking, and distance is removed, only covering from sound masking remains to improve speech privacy levels.
- Various sound masking design approaches may be taken dependent on the performance requirements, budget, and the architecture present.
- Good sound masking is unobtrusive to occupants by being spatially / spectrally consistent, using the proper sound spectrum, and is tailored in level for differing spaces within the facility.
- Cambridge Sound Management provides integrator friendly sound masking systems, regardless of product approach, which result in effective solutions based on the physics of sound.



Thank You!

Q & A

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