

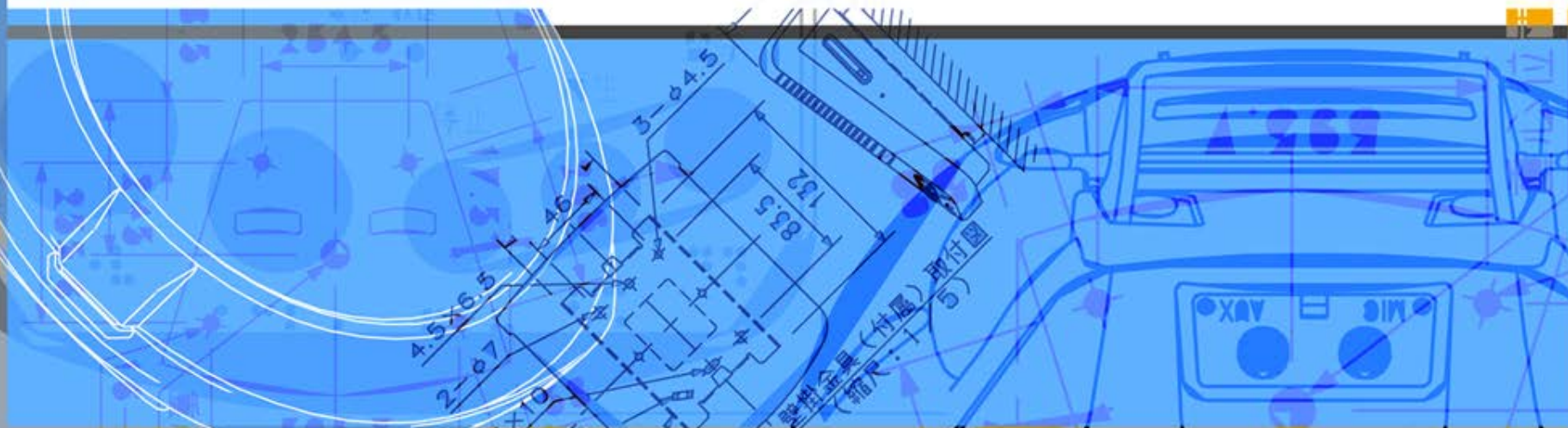


Introduction of long-distance transmission speakers and examples of adoption

TOA Measures for disaster prevention projects



TOACorporation



Outdoor Speaker challenges ①

It's ringing but I can't hear

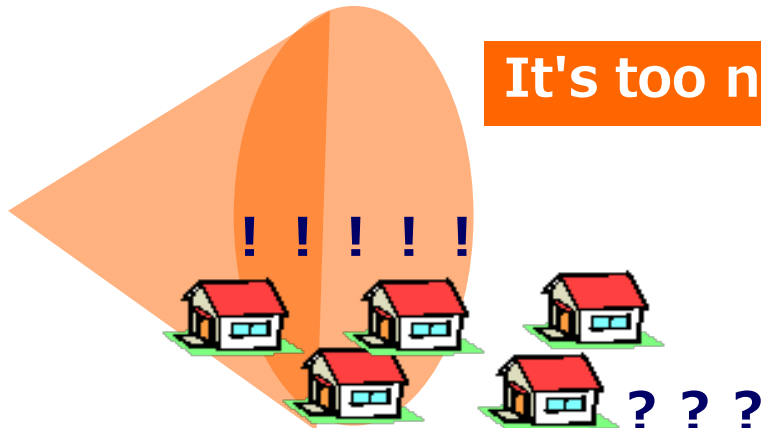
If a large number of speakers are installed in a narrow range, sound congestion or troll sounds

What are you talking about? Don't know.

Moreover, the clarity is deteriorated when "reflected sound" from the building and the mountain overlaps.



The far performance of general outdoor speakers is about 300m



It's too noisy.

The house near the place where the outdoor loudspeaker is installed annoyingly oppositely and the broadcast content is not heard in a distant house

Outdoor Speaker challenges ②

The volume goes down with cover

Sounds cannot be transmitted through buildings and mountains, so the sound of outdoor speakers may not be heard at all



Sounds of outdoor speakers are masked by a crowded sound or a vehicle passing sound



Sounds of outdoor speakers are drowned because the noise level is very high along crowded places and roads with heavy traffic

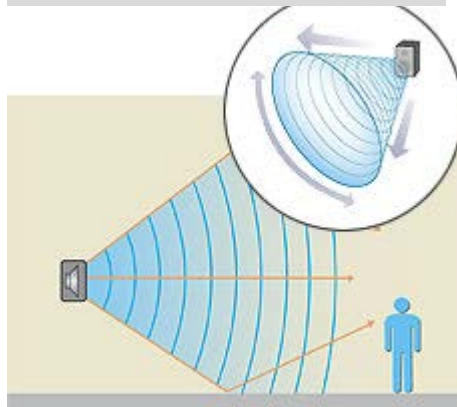
TOA Technology (Horn array speaker)

The next high performance of the sound generation type Disaster prevention Speaker

- **2 to 3 times** farther performance of conventional speaker
- **gentle in the vicinity** and clearly in the distance

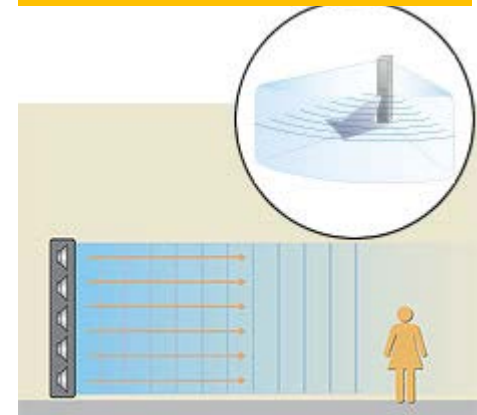


Traditional speakers



If the distance doubles the volume is $1/4$

Horn Array Speaker



Even if the distance doubles the volume is $1/2$

Long distance transmission Type speaker Product Lineup

**Horn Array Speaker
(8Units type,4Units type)**



4Units (600 - 700m)
8Units (800 - 1,000m)

**Medium Horn Array Speaker
(4Units type,6Units type)**



Can be installed in steel pipe column for disaster prevention Radio

(released in July.2018)

4Units (500 - 700m)
6Units (700 - 900m)

**Slim speaker for disaster prevention
(1Unit and 2Units stack)**



Can be installed in steel pipe column for disaster prevention Radio

(60w/50w/30w switchable)

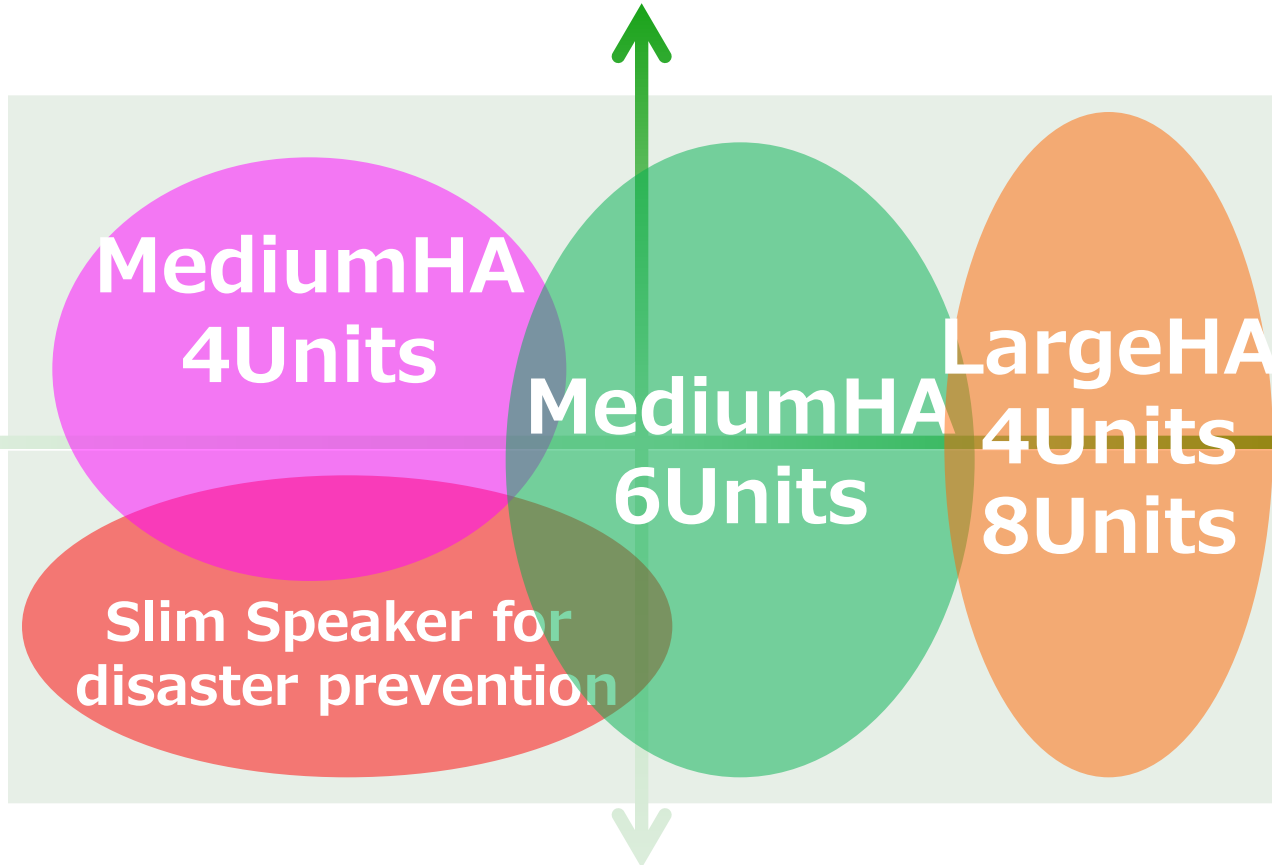
1Unit (400 - 600m)
2Units (600 - 800m)

* Distances vary greatly depending on the installation environment

Long distance transmission type speaker (applicable environment)

Complex terrain, many obstacles, windy

On existing pillars
Can be installed

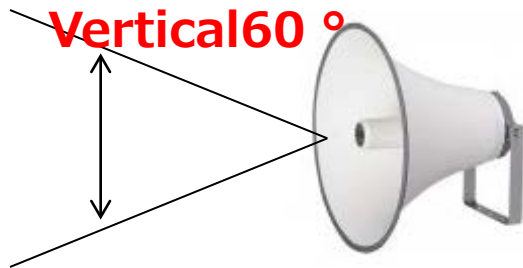


On existing pillars
Impossible to install

Flat terrain, few obstacles, wind is weak

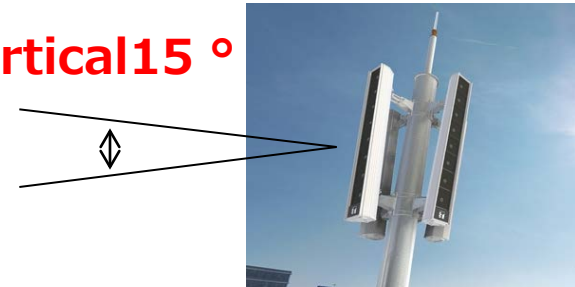
Product Features ① (sound is not spread up and down, and is gentle directly below)

**Traditional speakers
(Trumpet type)**

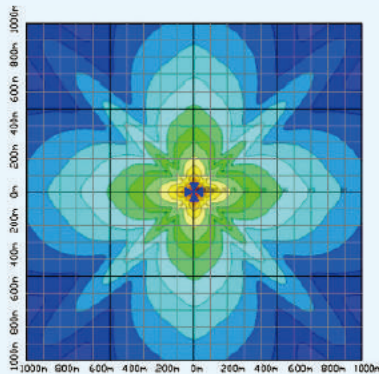


**Horn Array Speaker
Slim speaker for disaster prevention**

Vertical 15°

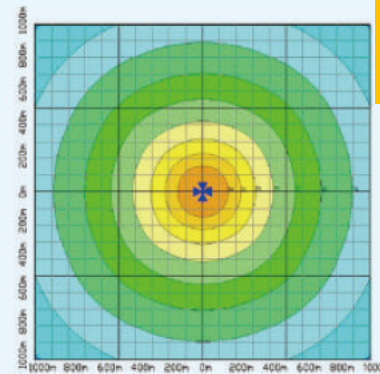


Sound pressure distribution (In the case of 4 directions)



**Traditional speakers
50W**

● Point source
H 60°
V 60°
High less than 15m
Output 30W or 50W



**Slim speaker for disaster prevention
50W**

● Line array
H 90°
V 15°
High less than 15m
Output 50W

Legend



Listening height:
1.2m

The numerical value is the sound pressure level at 250Hz to 4Hz.
The sound pressure distribution diagram is the examination result of only direct sound.
Reverberation sounds such as diffraction and reflection are not considered.

Product Features ② (Improves clarity by correcting air absorption of sound)

◆ To compensate for the air absorption of the sound. Eqbox to achieve a clear sound even in the distance (TOA Original function)

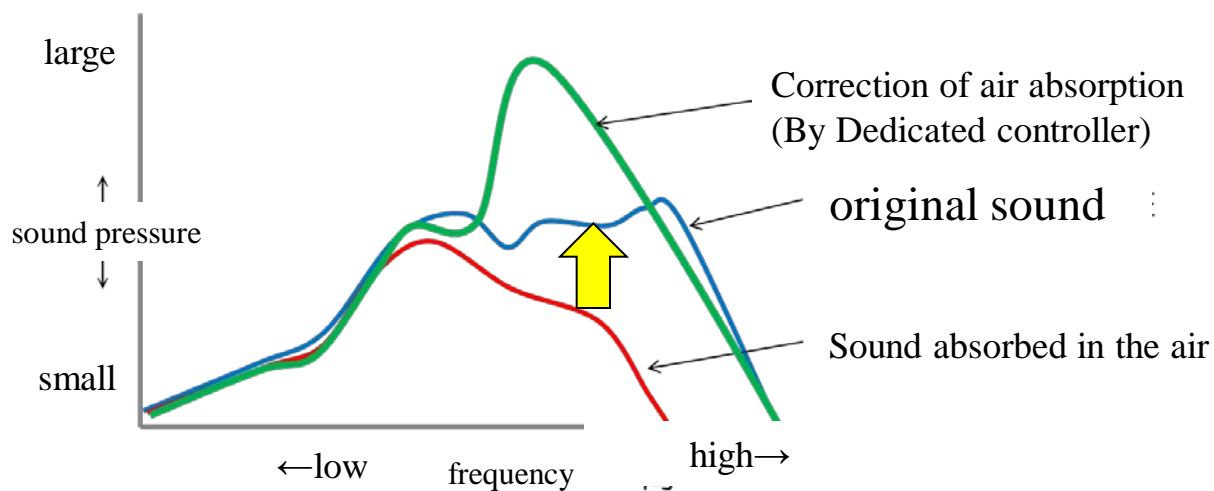
⇒ The higher the sound, the more the property is absorbed into the air.

And this is one of the reasons for the poor clarity.

⇒ The sound of fireworks is a dry sound in the vicinity, but it is a phenomenon of the air absorption to hear "dawn" low in the distance.

⇒ By correcting (boosting) the air absorption with the dedicated controller, It can provide clear sound even at long distances.

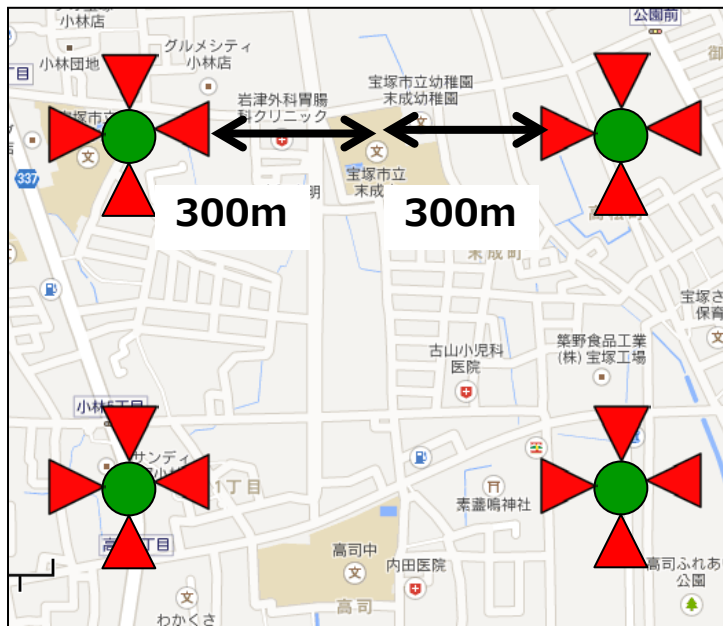
⇒ also this Dedicated controller has a "clear" audible effect without a loud sound.



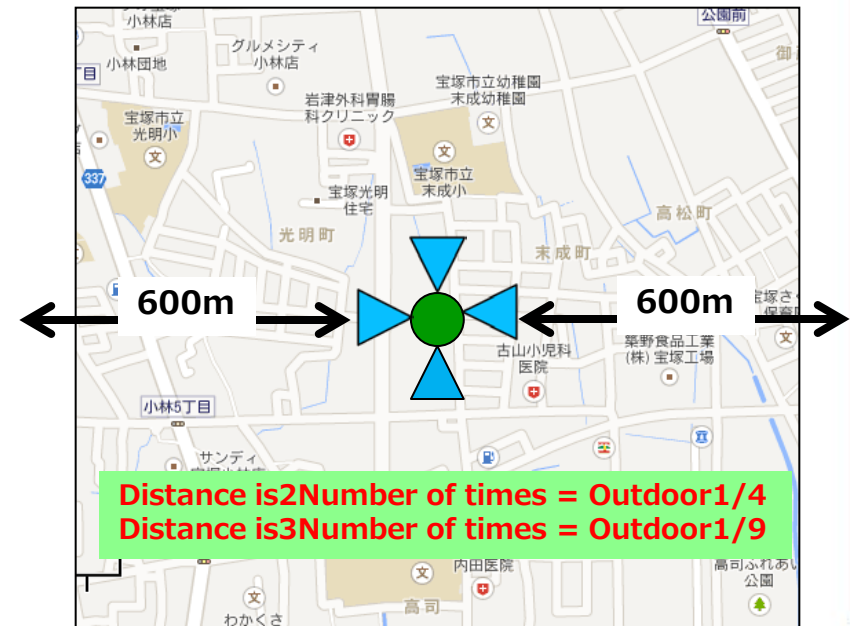
* One dedicated controller is required for one slave station

Introduction effect(The consolidation and reduction of child stations contributes to clarity and budget)

Conventional Speaker Installation Example



Example of slim installation for disaster prevention

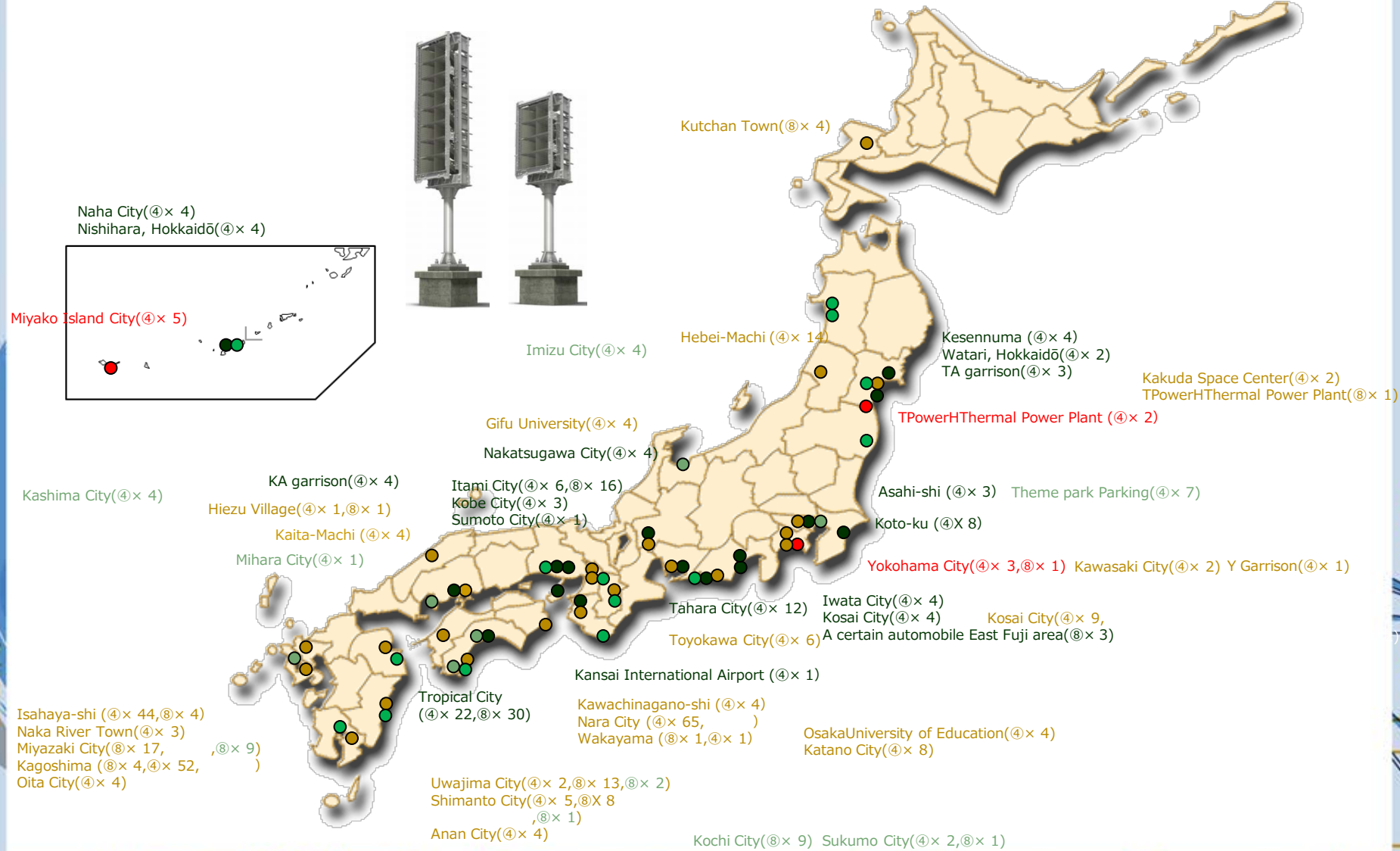


When the number of outdoor enlarged stations decreases...

- ① **Decreased sound overlap** And the disaster information will be transmitted clearly, leading to rapid evacuation behavior
- ② Initial costs and **Lower running costs** Lead to

Horn Array Speaker Adoption results (nationwide)

Total number of installations = about 826 sets (As of March 2018)



Use of Slim speaker for disaster Prevention (Hokkaido area)

Total sales volume in Japan 8,300units(As of March 2018)



| | | |
|-------------------|------------------------|-----|
| Hokkaido | Muroran City | 28 |
| | Hidaka, Hokkaidō | 12 |
| | Oketo, Hokkaidō | 3 |
| | Kamikawa, Hokkaidō | 3 |
| | Akkeshi, Hokkaidō | 3 |
| | A certain municipality | 2 |
| Aomori Prefecture | Yokohama, Hokkaidō | 39 |
| | Unknown | 24 |
| | Xinxiang Village | 7 |
| | Hachinohe City | 6 |
| | Liveaboard, Hokkaidō | 4 |
| | Rokunohe, Hokkaidō | 3 |
| | Mutsu City | 1 |
| Iwate Prefecture | Rikuzentakata City | 14 |
| | Iwaizumi, Hokkaidō | 1 |
| | A certain city | 1 |
| Akita Prefecture | Yuri Honjo City | 197 |
| | Three towns | 20 |
| | Ogata Village | 13 |
| | Akita City | 12 |
| | Fujisato, Hokkaidō | 3 |

Adoption of Slim speaker for disaster Prevention (Tohoku area)

Total sales volume in Japan =8,300units(As of March 2018)



| | | |
|-------------------|--------------------|----|
| Miyagi Prefecture | Sendai City | 29 |
| | Osaki City | 28 |
| | Mountain Yuan Town | 21 |
| | Kesenuma City | 8 |
| | Kawasaki, Hokkaidō | 3 |
| | Marumori, Hokkaidō | 3 |
| | Murata, Hokkaidō | 2 |

| | | |
|---------------------|---------------------|-----|
| Yamagata Prefecture | Higashine City | 182 |
| | Takahata, Hokkaidō | 107 |
| | Nishikawa, Hokkaidō | 55 |
| | Shinjo City | 41 |
| | Murayama City | 36 |
| | Nanyo City | 17 |
| | Shonai, Hokkaidō | 15 |
| | Oguni, Hokkaidō | 13 |
| | Obanazawa City | 12 |
| | Yonezawa City | 10 |
| | Asahi Town | 7 |
| | Nagai City | 4 |

Adoption of Slim speaker for disaster Prevention (Tohoku area)

Total sales volume in Japan =8,300units(As of March 2018)



| | | |
|----------------------|----------------------|-----|
| Fukushima Prefecture | Date City | 146 |
| | Yabuki, Hokkaidō | 62 |
| | Izumizaki Village | 29 |
| | Futaba, Hokkaidō | 28 |
| | Koori, Hokkaidō | 19 |
| | Koriyama City | 17 |
| | Tomioka, Hokkaidō | 12 |
| | Kagamiishi, Hokkaidō | 8 |
| | Hirata Village | 6 |
| | Aizu Misato Town | 2 |

Adoption of Slim speaker for disaster Prevention (Kanto area)

Total sales volume in Japan =8,300units(As of March 2018)



| | | |
|-------|--------------|-----|
| Tokyo | Edogawa Ward | 136 |
| | Koto Ward | 58 |
| | Tama City | 8 |
| | Minato-ku | 7 |
| | Sumida Ward | 5 |
| | Shibuya-ku | 4 |
| | Fuchu? | 3 |
| | Kodaira City | 3 |
| | Chiyoda-ku | 1 |

| | | |
|---------------------|----------------------|-----|
| Kanagawa Prefecture | Kawasaki City | 160 |
| | Kawasaki-shi Tama-ku | 16 |
| | Manazuru, Hokkaidō | 9 |
| | Kamakura City | 6 |
| | Atsugi City | 5 |
| | Hiratsuka City | 2 |
| | Sagamihara City | 1 |

| | | |
|------------------|----------------------|----|
| Chiba Prefecture | Kujukuri, Hokkaidō | 75 |
| | Funabashi City | 44 |
| | Ichinomiya, Hokkaidō | 20 |
| | Yachiyo City | 4 |
| | Narashino City | 4 |
| | Shisui, Hokkaidō | 1 |

Adoption of Slim speaker for disaster Prevention (Kanto area)

Total sales volume in Japan =8,300units(As of March 2018)



| | | |
|--------------------|---------------------|----|
| Tochigi Prefecture | Shimono City | 16 |
| | Nasu-machi | 4 |
| Saitama Prefecture | Tokorozawa City | 8 |
| | Miyashiro, Hokkaidō | 4 |
| | Ogawa, Hokkaidō | 2 |
| Gunma Prefecture | Takasaki City | 6 |
| | Tomioka City | 4 |
| Ibaraki Prefecture | Yuki City | 2 |
| | Furukawa-shi | 1 |

| | | |
|---------------------|----------------------|-----|
| Nagano Prefecture | Yamanouchi, Hokkaidō | 75 |
| | Suwa City | 61 |
| | Kijimadaira Village | 48 |
| | Karuizawa, Hokkaidō | 14 |
| | Sakaki, Hokkaidō | 13 |
| | Kiso Local Office | 6 |
| | Hiratani Village | 3 |
| Shizuoka Prefecture | Yoshida, Hokkaidō | 148 |
| | Ito City | 21 |
| | Iwata City | 19 |
| Niigata Prefecture | Niigata City | 85 |
| | Joetsu City | 3 |
| | Gosen City | 2 |
| | Itoigawa City | 2 |

Adoption of Slim speaker for disaster Prevention (Chubu area)

Total sales volume in Japan =8,300units(As of March 2018)



| | | |
|------------------|----------------------------|-----|
| Aichi Prefecture | Nagoya City | 937 |
| | Nishio City | 26 |
| | Tokoname City | 21 |
| | Tahara City | 11 |
| | Toyohashi City | 8 |
| | Agui, Hokkaidō | 4 |
| | Shitara, Hokkaidō | 4 |
| | Toyokawa City | 2 |
| | The Bureau of maintenance? | 2 |
| | Kasugai City | 1 |

| | | |
|---------------------|---------------|----|
| Ishikawa Prefecture | Kaga City | 45 |
| | Nonoichi City | 6 |
| Fukui Prefecture | Sabae City | 12 |
| Gifu Prefecture | Gujo City | 8 |
| | Kobe Town | 4 |
| Toyama Prefecture | Nanto City | 4 |

Adoption of Slim speaker for disaster Prevention (Kansai area)

Total sales volume in Japan =8,300units(As of March 2018)



| | | |
|-------|---------------------|-----|
| Osaka | Osaka City | 401 |
| | Izumisano City | 210 |
| | Ikoma City | 104 |
| | Kaizuka City | 91 |
| | Settsu, Kumamoto | 76 |
| | Matsubara City | 57 |
| | Fujiidera City | 43 |
| | Suita City | 42 |
| | Sakai City | 34 |
| | Shimamoto, Hokkaidō | 31 |
| | Kashihara City | 25 |
| | Kumatori, Hokkaidō | 19 |
| | Toyonaka City | 8 |
| | Tondabayashi City | 6 |
| | Osaka Sayama-Shi | 5 |
| | Hirakata City | 3 |

Adoption of Slim speaker for disaster Prevention (Kansai area)

Total sales volume in Japan =8,300units(As of March 2018)



| | | |
|---------------------|---------------------|--------------|
| Hyogo Prefecture | Tamba City | 384 |
| | Akashi City | 128 |
| | Mita City | 116 |
| | Inami, Hokkaidō | 101 |
| | Kishiwada City | 95 |
| | Kobe City | 61 |
| | Aioi City | 49 |
| | Itami City | 41 |
| | Tondabayashi City | 6 |
| | Shiso City | 3 |
| | Kawanishi City | 2 |
| | Takarazuka City | 2 |
| | Shiga Prefecture | Maibara City |
| Love Town | | 169 |
| The town | | 14 |
| Nara Prefecture | Kawai, Hokkaidō | 58 |
| | Oji, Hokkaidō | 5 |
| Mie Prefecture | Kuwana City | 38 |
| | Owase City | 2 |
| Kyoto | Dai Yamazaki Town | 11 |
| Wakayama Prefecture | Shirahama, Hokkaidō | 1 |

Slim speaker for disaster Prevention (Shikoku, Chugoku area)

Total sales volume in Japan =8,300units(As of March 2018)



| | | |
|----------------------|---------------------|-----|
| Kagawa Prefecture | Sakaide City | 85 |
| | Sanuki City | 80 |
| | Tadotsu, Hokkaidō | 56 |
| Kochi Prefecture | Sukumo City | 80 |
| | Otsuki, Hokkaidō | 27 |
| | Kochi City | 1 |
| Tokushima Prefecture | Naka, Hokkaidō | 58 |
| | Upper Plate Town | 4 |
| Ehime Prefecture | Imabari City | 4 |
| | Matsumae, Hokkaidō | 2 |
| Yamaguchi Prefecture | Zhou Minami City | 179 |
| | Nagato City | 167 |
| | Kudamatsu City | 111 |
| Hiroshima Prefecture | Hiroshima City | 199 |
| | Fuchu City | 28 |
| | Fuchu, Hokkaidō | 4 |
| Tottori Prefecture | Tottori City | 87 |
| | Katsumada, Hokkaidō | 28 |
| | Kita-Sakae-machi | 2 |
| Okayama Prefecture | Kurashiki City | 9 |

Adoption of Slim speaker for disaster prevention (Kyushu/Okinawa area)

Total sales volume in Japan =8,300units(As of March 2018)



| | | |
|----------------------|--------------------|-----|
| Oita Prefecture | Oita City | 173 |
| | Nakatsu City | 2 |
| Kumamoto Prefecture | Amakusa City | 110 |
| | Hikawa Town | 20 |
| | UTO City | 18 |
| | Yatsushiro City | 8 |
| Saga Prefecture | Imari City | 52 |
| | Kamimine, Hokkaidō | 24 |
| | Takeo City | 3 |
| Okinawa Prefecture | Nanjo City | 61 |
| | Itoman City | 9 |
| | Nago City | 3 |
| Fukuoka Prefecture | Miya-shi | 56 |
| | Hirokawa, Hokkaidō | 4 |
| | Iizuka City | 2 |
| Nagasaki Prefecture | Omura City | 29 |
| | Isahaya City | 14 |
| Kagoshima Prefecture | Kagoshima City | 30 |
| Miyazaki Prefecture | Kadogawa, Hokkaidō | 7 |

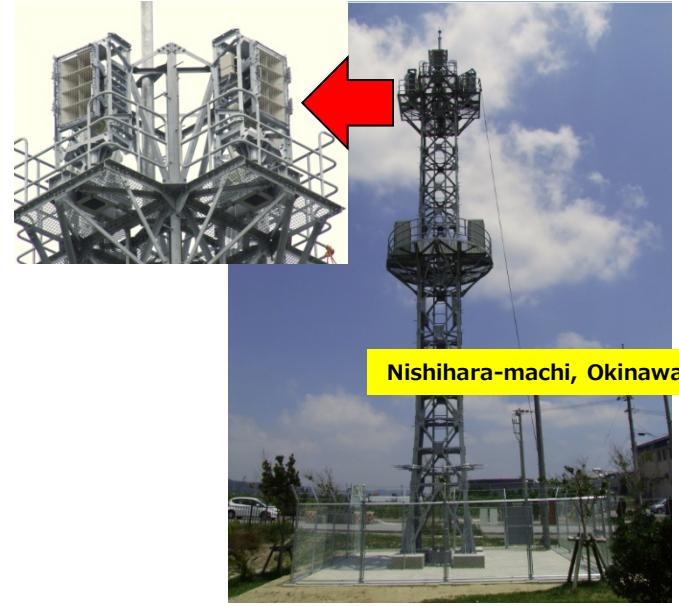
Examples of adoption



Koto-ku, Tokyo



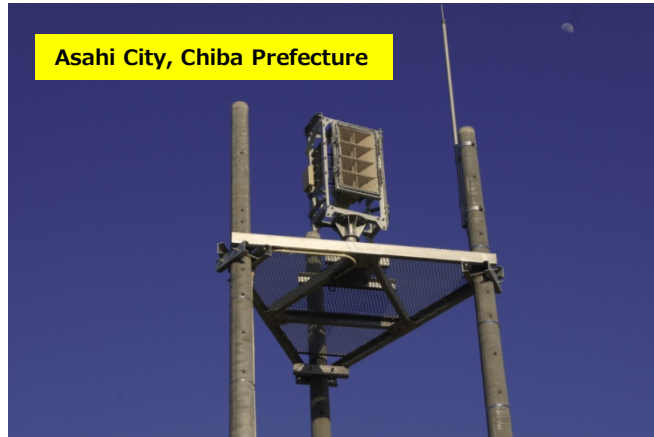
Naha, Okinawa



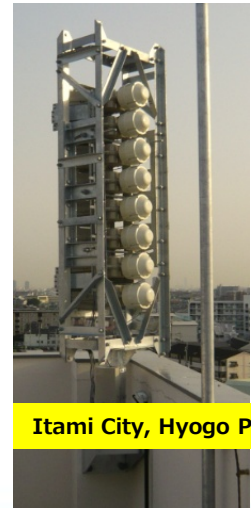
Nishihara-machi, Okinawa



Kesenuma City, Miyagi Prefecture

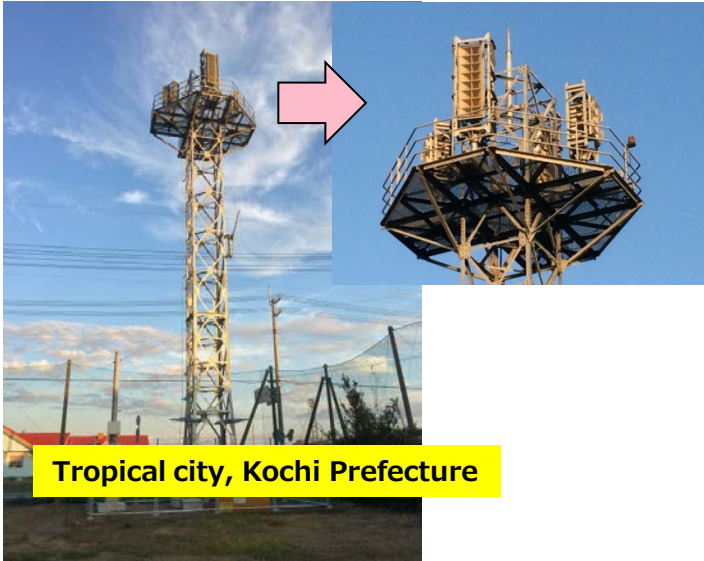


Asahi City, Chiba Prefecture



Itami City, Hyogo Prefecture

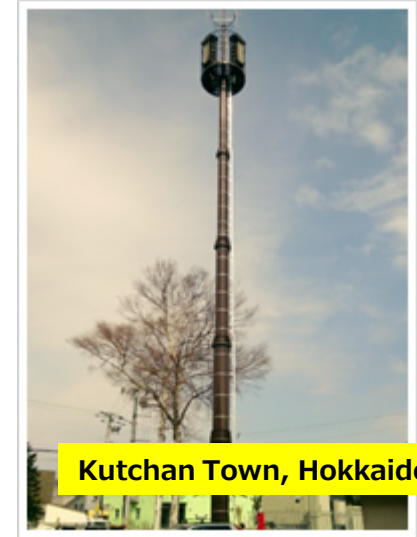
Examples of adoption



Tropical city, Kochi Prefecture



Wakayama, Wakayama



Kutchan Town, Hokkaido



Shimanto City, Kochi Prefecture



Isahaya City, Nagasaki Prefecture



Oita, Oita

Examples of adoption



Sukumo City, Kochi Prefecture



Kochi, Kochi



Nakatsugawa City, Gifu Prefecture



Sendai City, Miyagi Prefecture

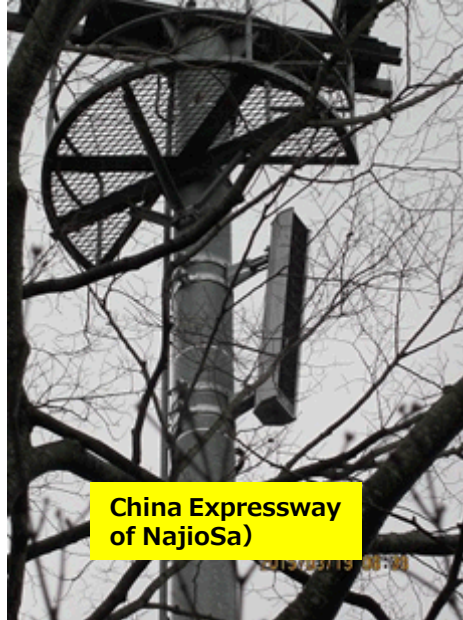


Koto-ku, Tokyo

Examples of adoption



Akita Prefecture Yuri Honjo City



China Expressway of NajioSa



Koto-ku, Tokyo



Tochigi Prefecture Field City (Rumble Test)



Koto-ku, Tokyo

Examples of adoption



Sanda, Hyogo



Atsugi-shi, Kanagawa



Omura City, Nagasaki Prefecture



Tama City, Tokyo



Iwata City, Shizuoka Prefecture



Osaka City, Osaka Prefecture



Muroran, Hokkaido

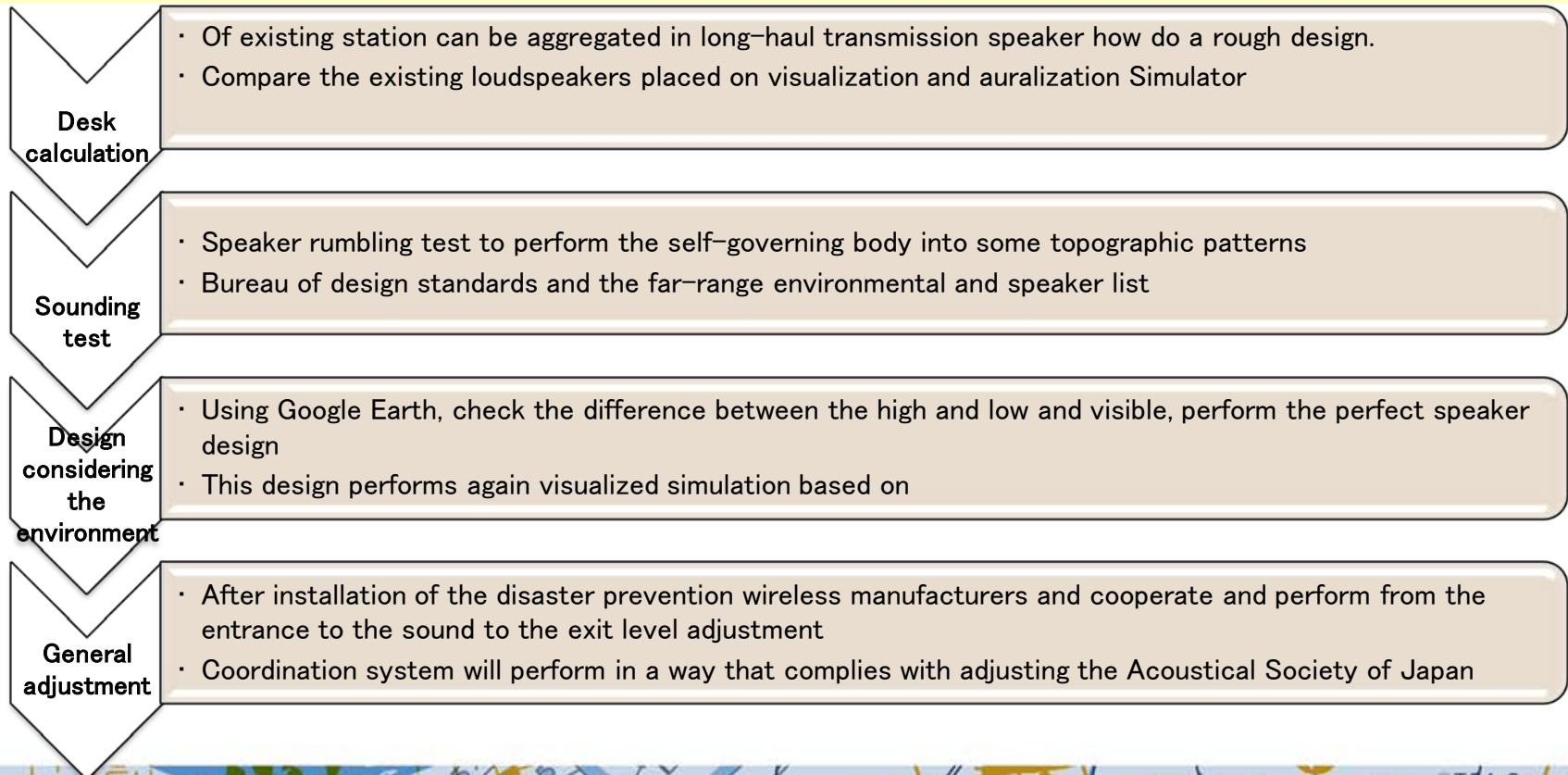
TOA The Power of Engineering

Simply installing a long-distance transmission speaker is not enough to achieve a clear sound.

Also, if you simply set up a speaker with high distance, the risk of building and terrain reflections increases. "Design of child stations considering topography and installation environment" is extremely important.

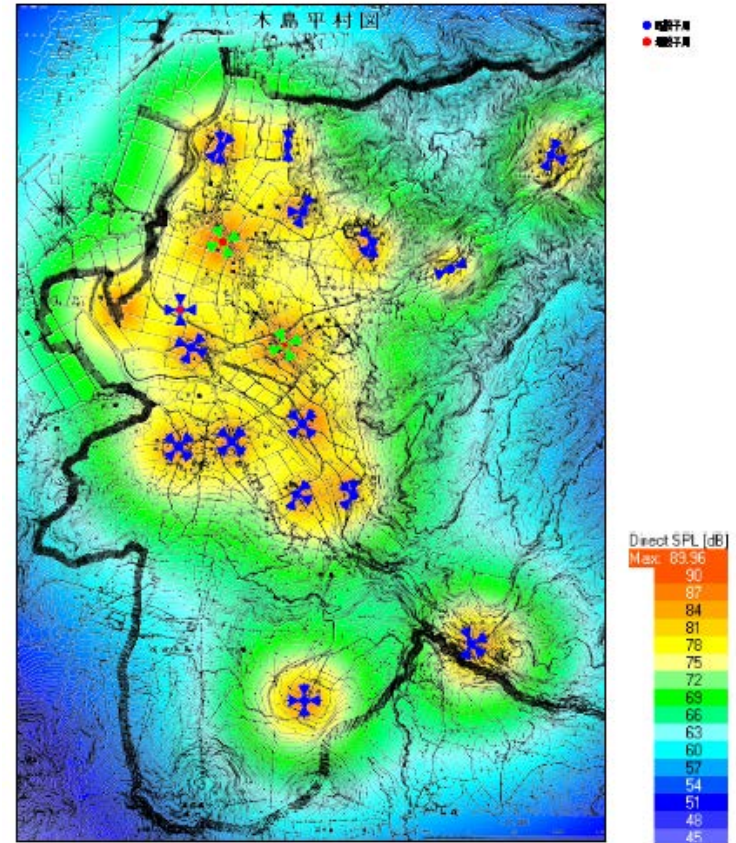
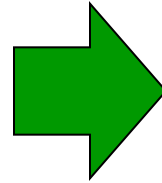
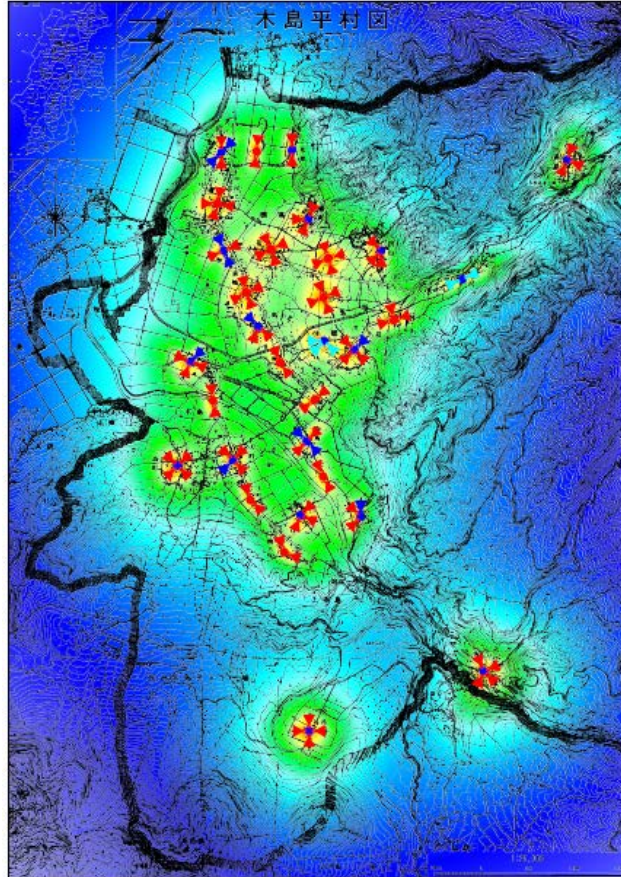
TOA's 300 Based on the know-how acquired in the more than one X We will provide you with a clear sound with engineering power.

(Some paid service.) Please contact us for more information.)



Desk calculation ① (sound visualization)

A desk calculation to visualize speaker sounds. It is a method of expressing the size of the sound by the color unlike the conventional sound star figure. It can also be used for community briefings.



Status of existing speakers

Confirm improvement after
slave station aggregation

Improvement status after
slave station aggregation

Desk calculation ② (sound audible)

Audio simulator

It is a software that can actually hear "how to hear" such as congestion and attenuation of the distance between speakers.
-Can be simulated in any region using the image of the map software. The listening points and speakers can be set anywhere.
Not only the voice of the Voice, but also the sound of rain and road noise can be played at the same time, it is possible to play a situation near reality.



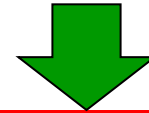
Rumble Test (Check the impact of terrain and installation environment)

Check the distance of each speaker at different locations, such as flat, urban, mountainous or coastal areas.

It is necessary to have a preliminary meeting on the date of implementation and place of implementation.



2011 Years from
Total of 330 or more
Conducted by local government



This site know-how
TOAIt is the greatest strength of
design power.



| 機種の別 | 設置ポイント | スピーカー | 高出力型 | 入力音 | 出力音 |
|-------------------|-------------------|-----------------|------|---------|---------|
| 北東方向 | 1500m 高さ+10m | 両面型S1A2型 (100W) | --- | 5.4 | 3.2 1.0 |
| | | 両面型S1A2型 (200W) | --- | 5.4 | 3.2 1.0 |
| | 200100m 高さ+10m | 両面型S1A2型 (100W) | --- | 5.4 | 3.2 1.0 |
| | | 両面型S1A2型 (200W) | --- | 5.4 | 3.2 1.0 |
| | 300100m 高さ+10m | 両面型S1A2型 (100W) | --- | 5.4 | 3.2 1.0 |
| | | 両面型S1A2型 (200W) | --- | 5.4 | 3.2 1.0 |
| 西方向 | 1500m 高さ+10m | 両面型S1A2型 (100W) | --- | 5.4 | 3.2 1.0 |
| | | 両面型S1A2型 (200W) | --- | 5.4 | 3.2 1.0 |
| | 200300m 高さ+10m | 両面型S1A2型 (100W) | --- | 5.4 | 3.2 1.0 |
| | | 両面型S1A2型 (200W) | --- | 5.4 | 3.2 1.0 |
| | 301100m 高さ+10m | 両面型S1A2型 (100W) | --- | 5.4 | 3.2 1.0 |
| | | 両面型S1A2型 (200W) | --- | 5.4 | 3.2 1.0 |
| 40700m 高さ+10m | 両面型S1A2型 (100W) | --- | 5.4 | 3.2 1.0 | |
| | 両面型S1A2型 (200W) | --- | 5.4 | 3.2 1.0 | |
| 501000m 高さ+10m | 両面型S1A2型 (100W) | --- | 5.4 | 3.2 1.0 | |
| | 両面型S1A2型 (200W) | --- | 5.4 | 3.2 1.0 | |

*評価基準
 5. 非常に良い結果、評価が最も高い
 4. 非常に良い結果、評価が高い
 3. 非常に良い結果、評価が中程度
 2. 非常に良い結果、評価が低い
 1. 非常に良い結果、評価が最も低い
 (0.5未満は評価なし)





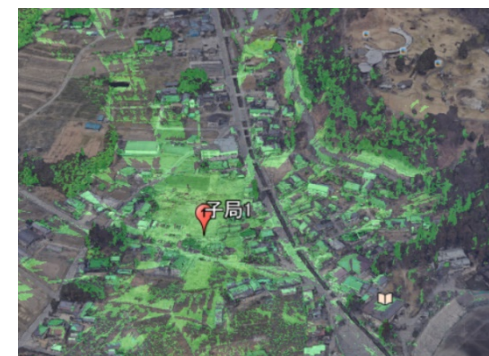
Support for design of outdoor enlarged child stations(considering installation environment)

The distances that can be covered by buildings, terrain, and ambient noise vary greatly. From the measurement results of the sound test, the design distance by the environment and by the speaker is listed, and the topography and the environment are considered. This is the process of selecting the speakers and designing the best outdoor spread station.

1, by environment and by Speaker design standard Table (example)

| | Flat (small obstacle) | Urban areas (obstacle-many) | Mountainous area (reflective large) | The coast (windy) |
|--------------------------------------|-----------------------|-----------------------------|-------------------------------------|-------------------|
| Traditional speakers | 300m | 150m | 200m | 150m |
| Slim speaker for disaster prevention | 500m | | | |
| Medium Horn Array | 600 metres | | | |
| Horn array4Soviet | Half a mile | | | |
| Horn array8Soviet | 1000m | | | |

2, cross section, visible area (utilizing map data)



Total system Adjustment (is the correct level out?)

Based on the standards of the acoustical society Japan, whether the sound source is appropriate to the acoustic output system (amplifier)? In cooperation with the disaster-prevention radio manufacturers to conduct comprehensive system adjustments.
 If this level adjustment is not performed optimally, the characteristic of the long-distance transmission type speaker is not demonstrated.

Construction model diagram of outdoor loudspeaker system

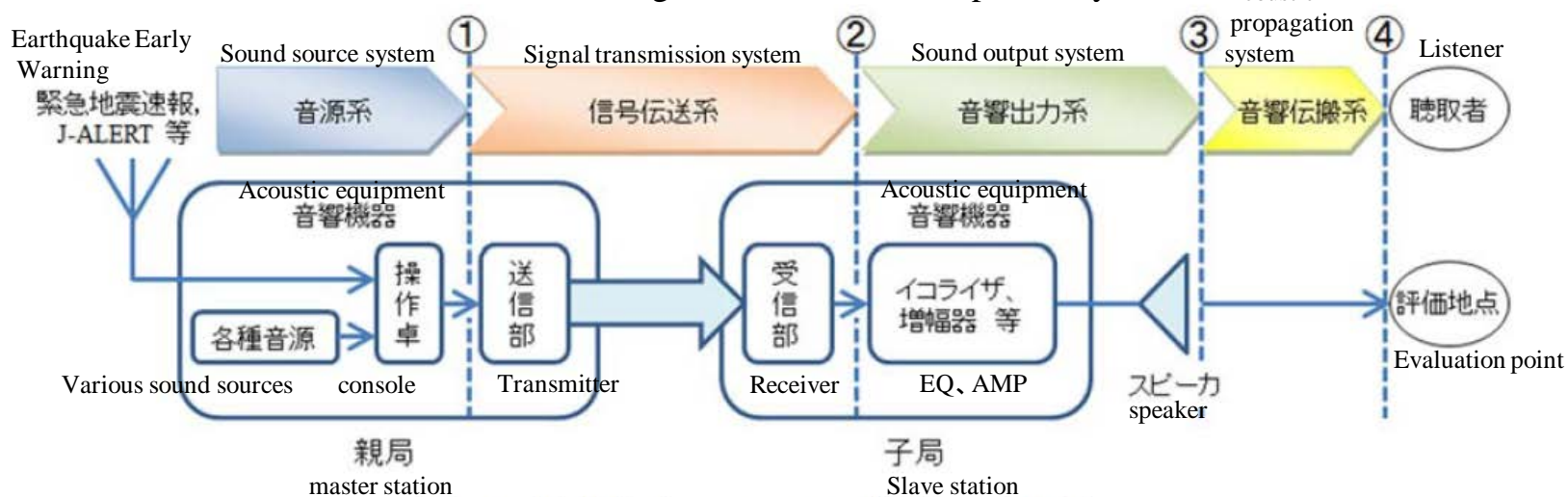


図 1 屋外拡声システムの構成モデル図



TOA's management philosophy is to "sell sounds rather than equipment"

What customers are really looking for is...

Not a speaker, but a clear sound

"Clear sound" = By transmitting "correct disaster information" to as many people as possible, we can save precious lives.

TOA Corporation aims to be a company that can contribute to society by providing clear sound and saving as much human lives as possible.



<http://www.toa.co.jp/>

 **TOA** Smiles for the Public