

2021-01 Capston Design

**Web 기반 실시간  
비디오 스트리밍 로봇**

*Deeply*

# Index

**1**

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**프로젝트 동기 및 배경**

**WebRTC란,**

**2**

---

**PROJECT**

**Mechanism**

**3**

---

**시연 영상**

**WebRTC의 미래**

# 1. 프로젝트 동기 및 배경

## 꼭 만나야 돼?...굴뚝산업도 '언택트 영업'

[중앙일보] 입력 2021.06.02 00:04 | 경제 3면 지면보기▶

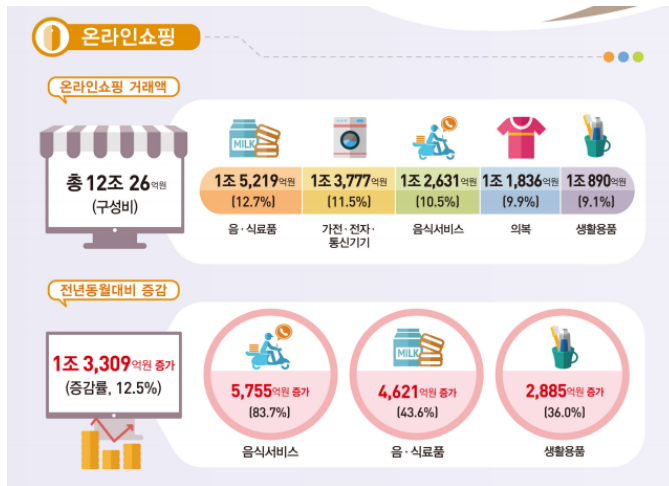
김경미 기자

[언택트 산업] 4차산업혁명이 낳고 코로나19가 키웠다...비대면 라이프스타일의 확산

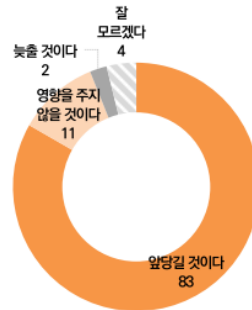
△ 박주환 기자 | ○ 승인 2020.06.19 18:07 | 💬 댓글 0

가요

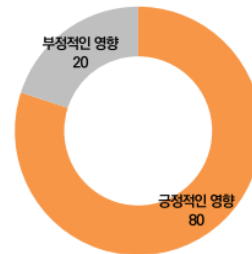
## '드림콘서트', 6월 26일 개최...언택트 방식 진행



코로나19, 디지털 시대 전환 앞당길 것이다 83%



디지털 시대 전환, 우리 사회에 긍정적 영향 미친다 80%

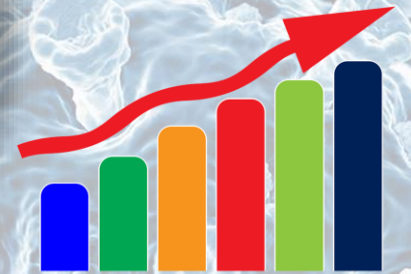


(단위 : %)

대면



비대면



# 1. 프로젝트 동기 및 배경

홈 > 뉴스 > 종합

## 해외 로봇 과학자들 "코로나19, 로봇 기술 연구 촉진"

'사이언스 로봇틱스'에 공동 기고



승인 2020.03.30 10:38:58



제조업용 로봇 판매량 기록 및 전망

[단위: 천대]



그래픽=유상연 기자 prtzy201@

BUSINESS watch

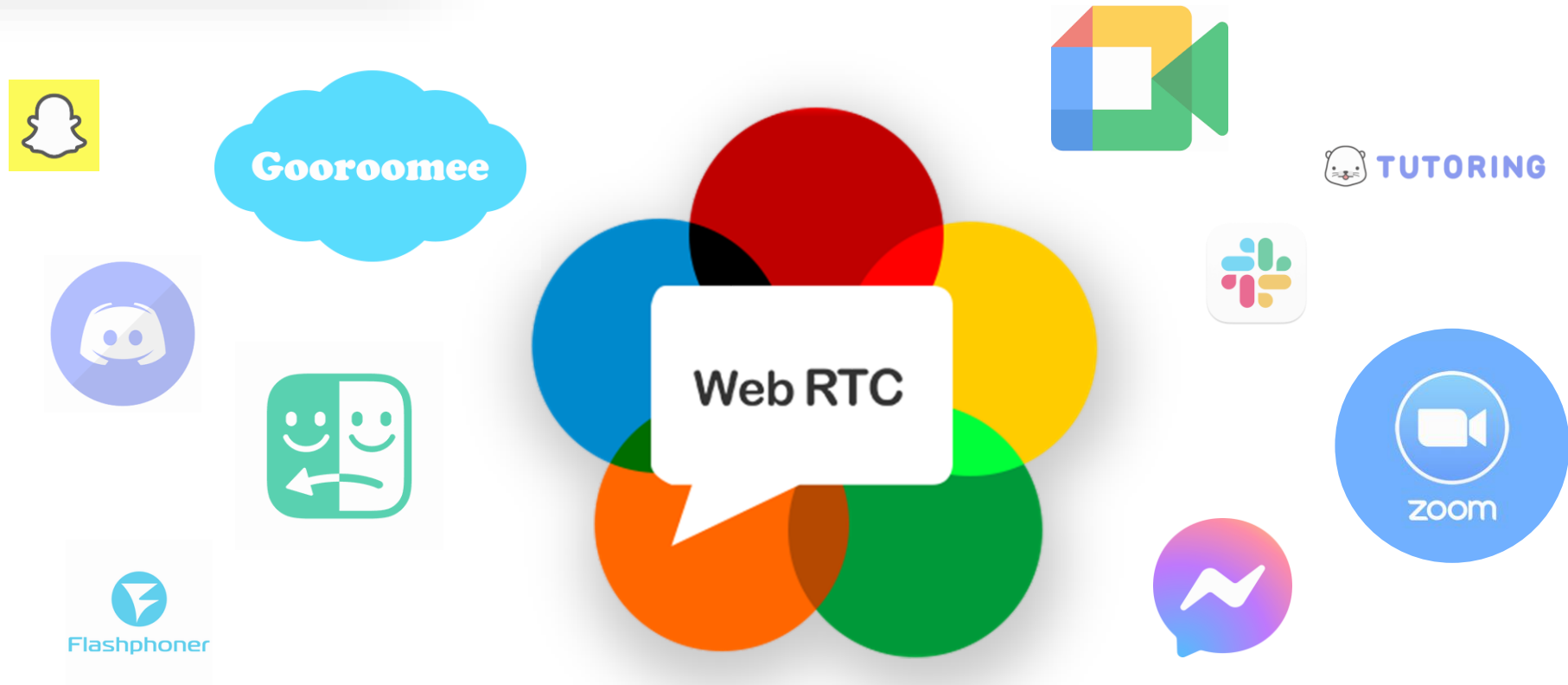
Robotics for Happiness



World Robot Summit



# 1. 프로젝트 동기 및 배경

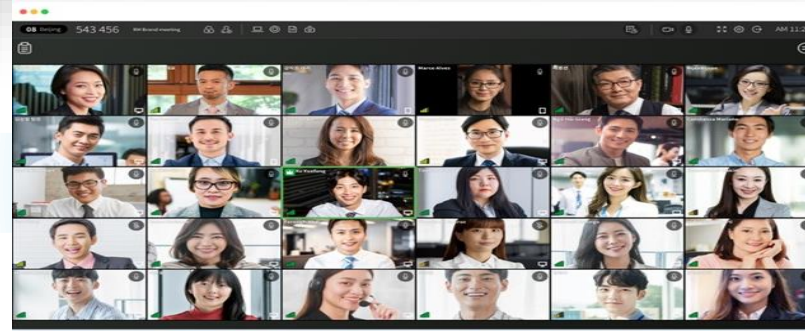


실시간 스트리밍 서비스 중 왜 **WebRTC**에 주목하였을까?



# 1. 프로젝트 동기 및 배경

과거



현재

플러그인 설치



서버 사용



# 1. WebRTC 관

# WebRTC

Web Real Time Communication

**Any  
Browser**

**Low  
Latency**

**No Plug In  
No Install**

**Security**

**P2P**

# 1. WebRTC 란





## 2. PROJECT



원격



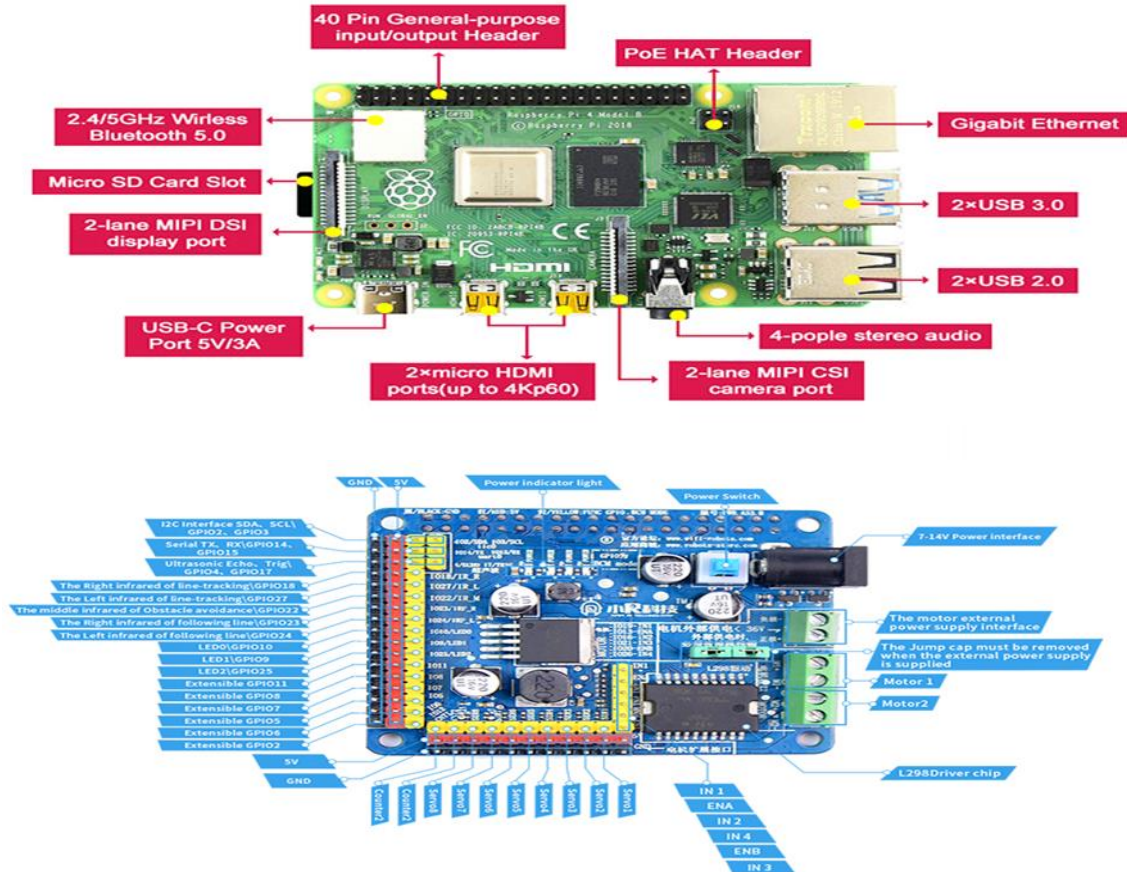
실시간



WebRTC

현장감

## 2. PROJECT



## 2. PROJECT

# UV4L

## UV4L

### User space Video4Linux

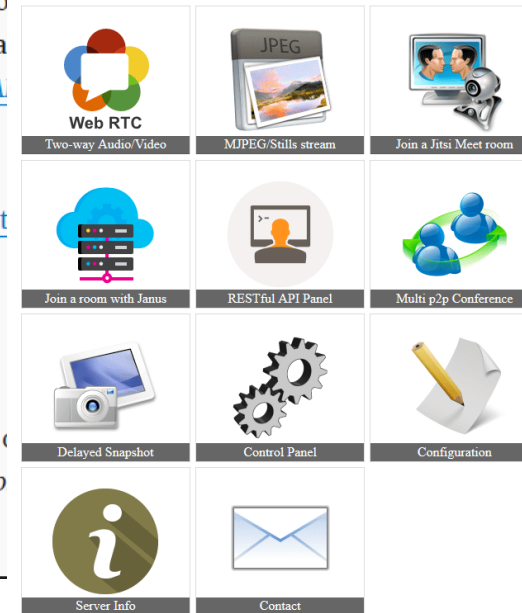
UV4L was originally conceived as a modular collection of *Video4Linux2-compliant*, cross-platform, **user space** drivers for real or virtual video input and output devices (with absolutely no external difference from kernel drivers). While still preserving the original intentions, UV4L has evolved over the years and now optionally includes a generic purpose *Streaming Server* plug-in, esp can serve **custom** web applications that can make use of a number of services for *Real-Time Communications* such as encrypted, bidirectional **streaming or conferencing** over the web. UV4L also provides a [RESTful API](#) to implement their own custom applications.

Click here for the installation instructions for [ARM](#) or [x86](#). Here some [tutorials](#)

Below is a list of the supported modules:

- UV4L core module ([features](#), [manual](#))
  - Streaming server with web front-end over HTTP/HTTPS and *on-the-fly* processing
- It also provides a [RESTful API](#) for developers and can run custom web applications

### [UV4L](#) Streaming Server



## 2. PROJECT



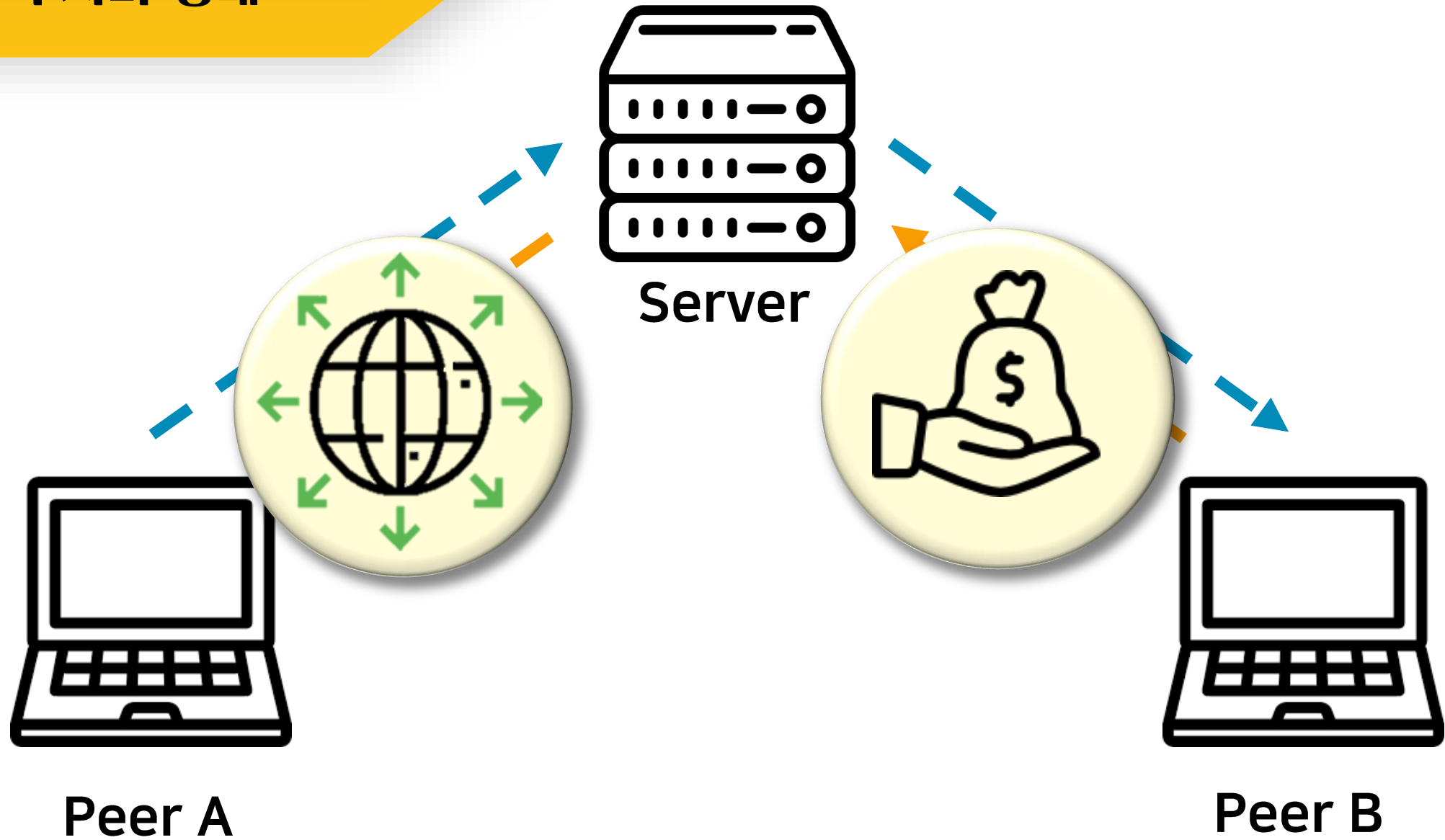
ROBOT

CONNECT



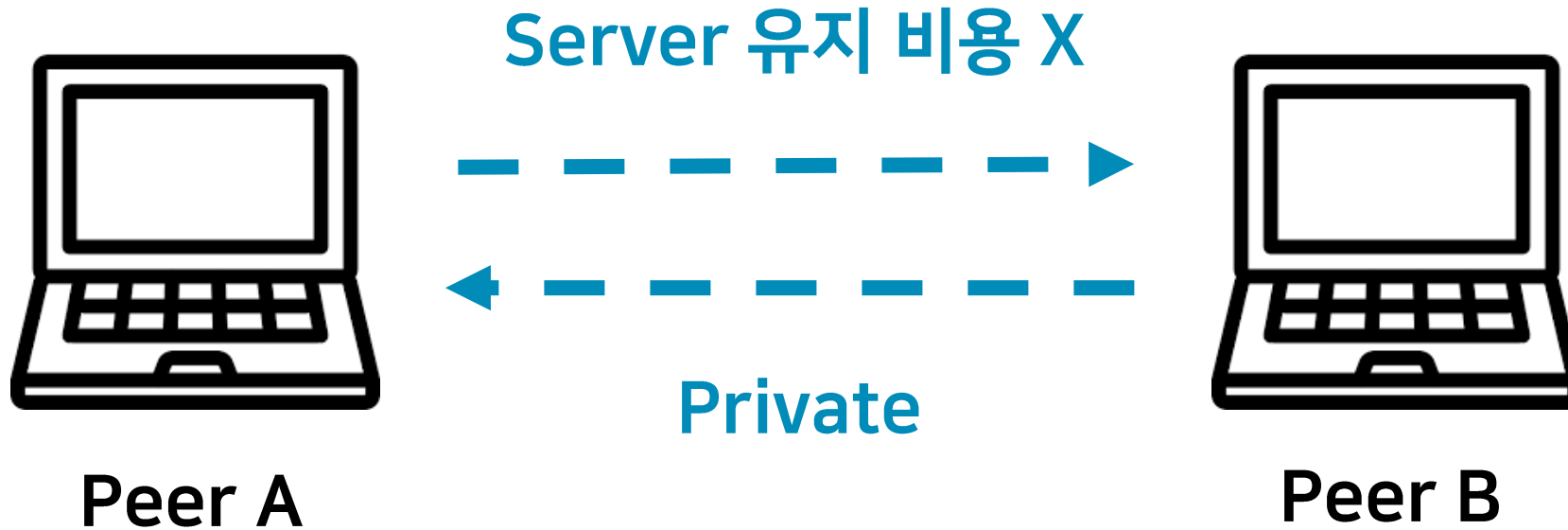
사용자

## 2. 기존의 서버 형태



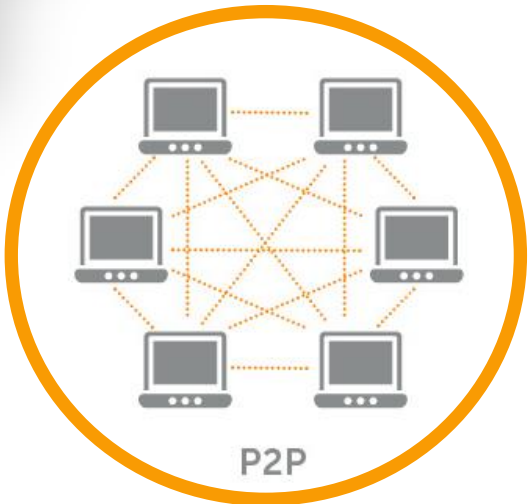
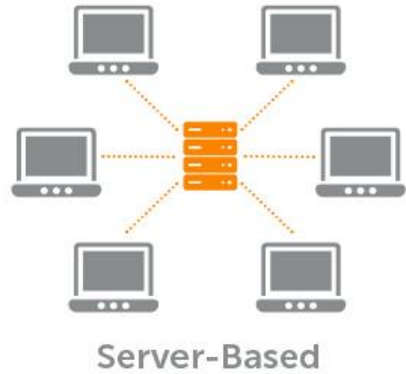
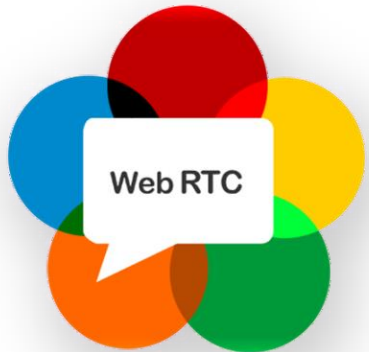
## 2. PROJECT

중간에 서버를 사용하지 않고, 이렇게 통신하면 어떨까?

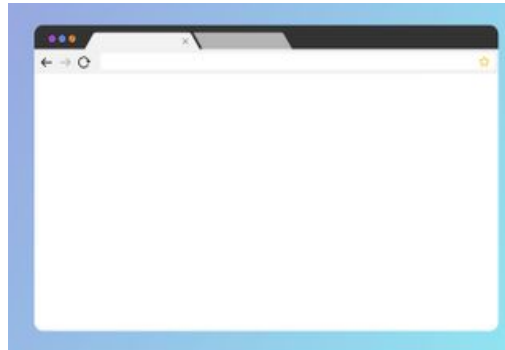




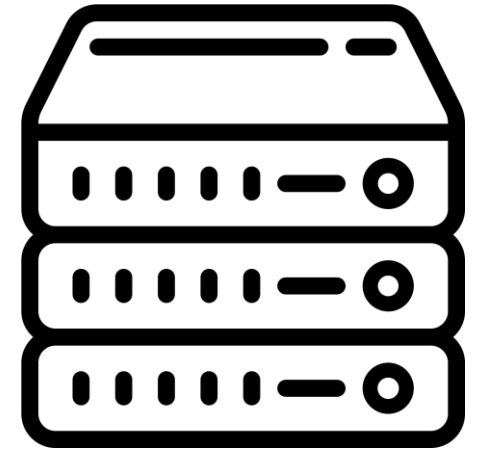
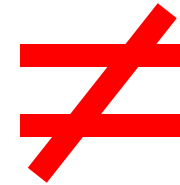
## 2. PROJECT



# 중재자



Web Browser



Web Server

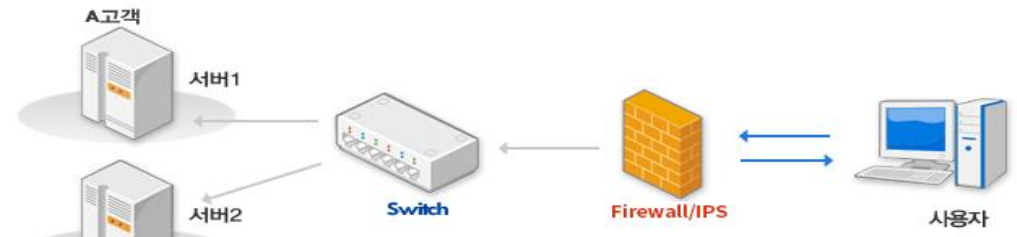
### 3. 구현 기술

내 Public IP가 뭐야?

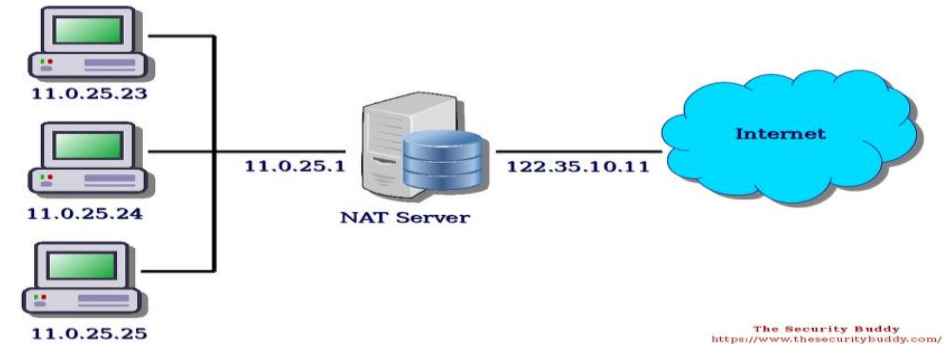


왜?

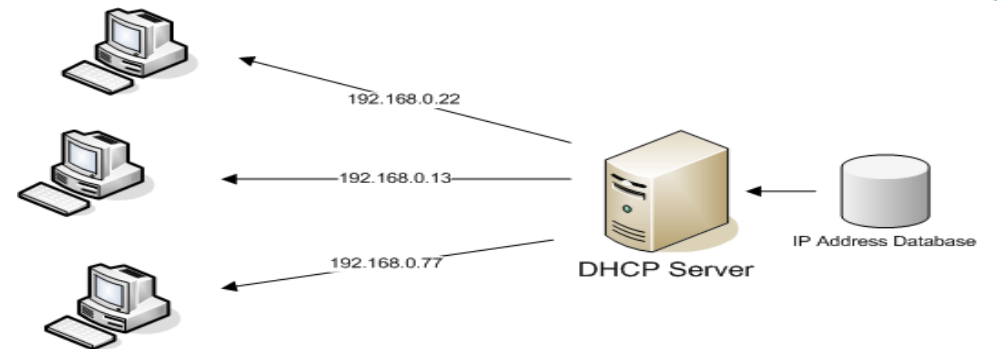
#### Fire Wall



#### NAT

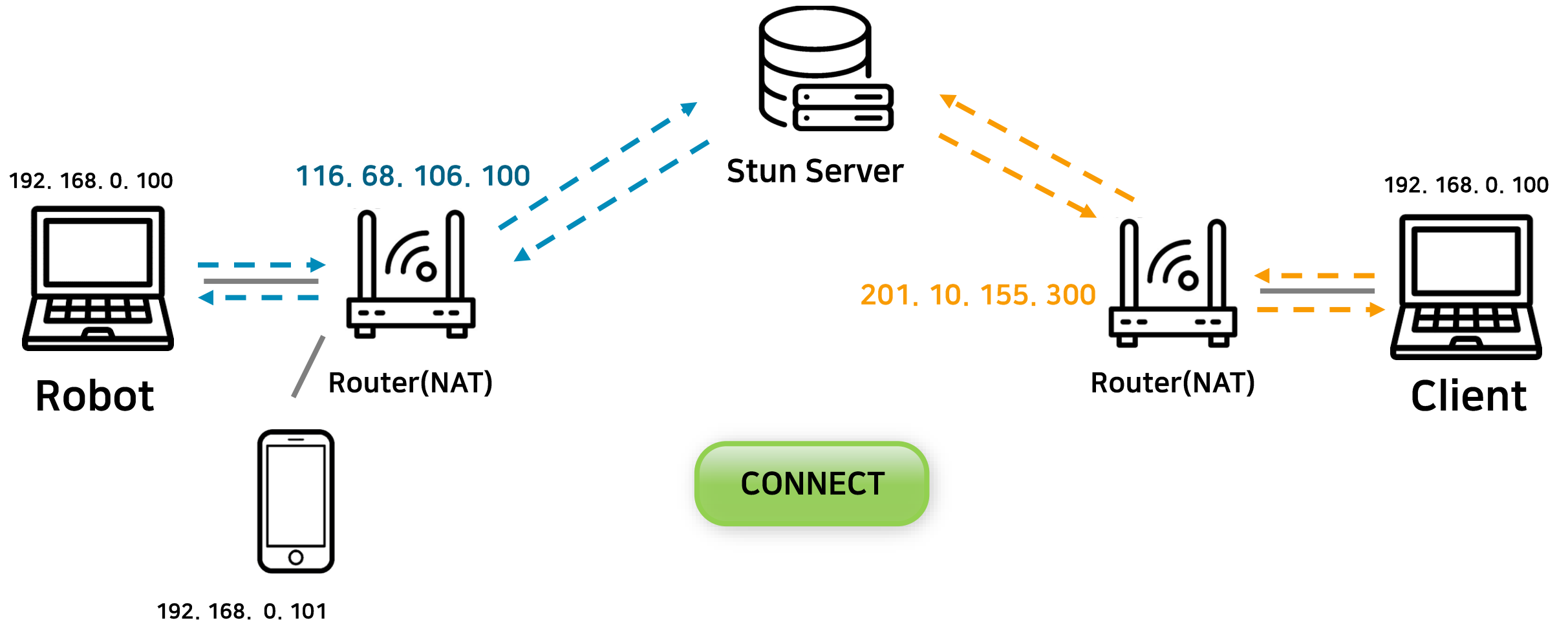


#### DHCP

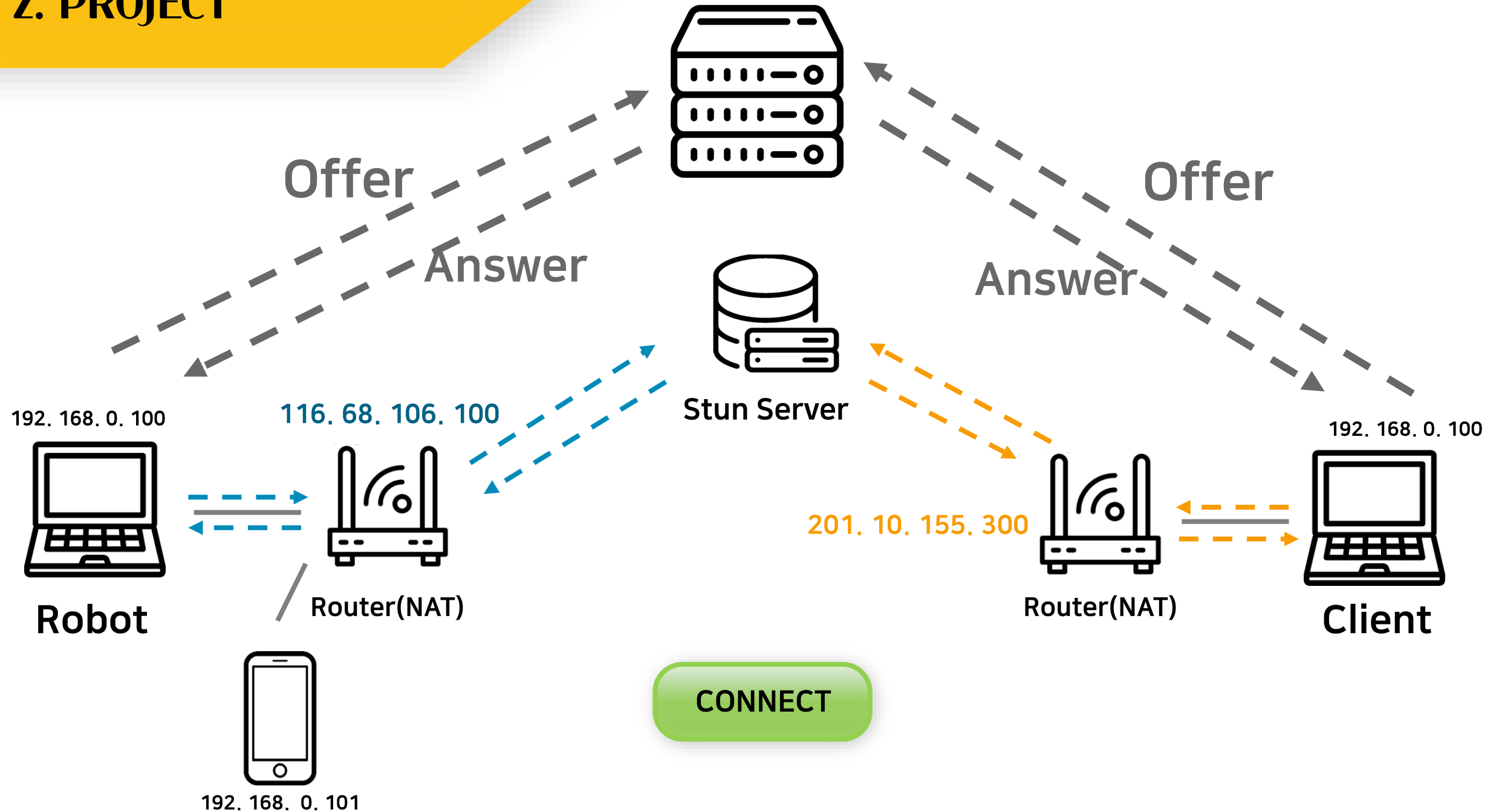


## 2. PROJECT

# Session *T*raversal *U*tilities for *N*AT



## 2. PROJECT



## 2. PROJECT

STUN : IP 주소, 프로토콜, 포트의 조합

# ICE Candidate

두 개의 단말이 P2P 연결을 가능하게 하도록 최적의 경로를 찾아주는 프레임워크



Stun Server

## 2. PROJECT

***Signaling***

***Using  
WebSocket***



## 2. PROJECT

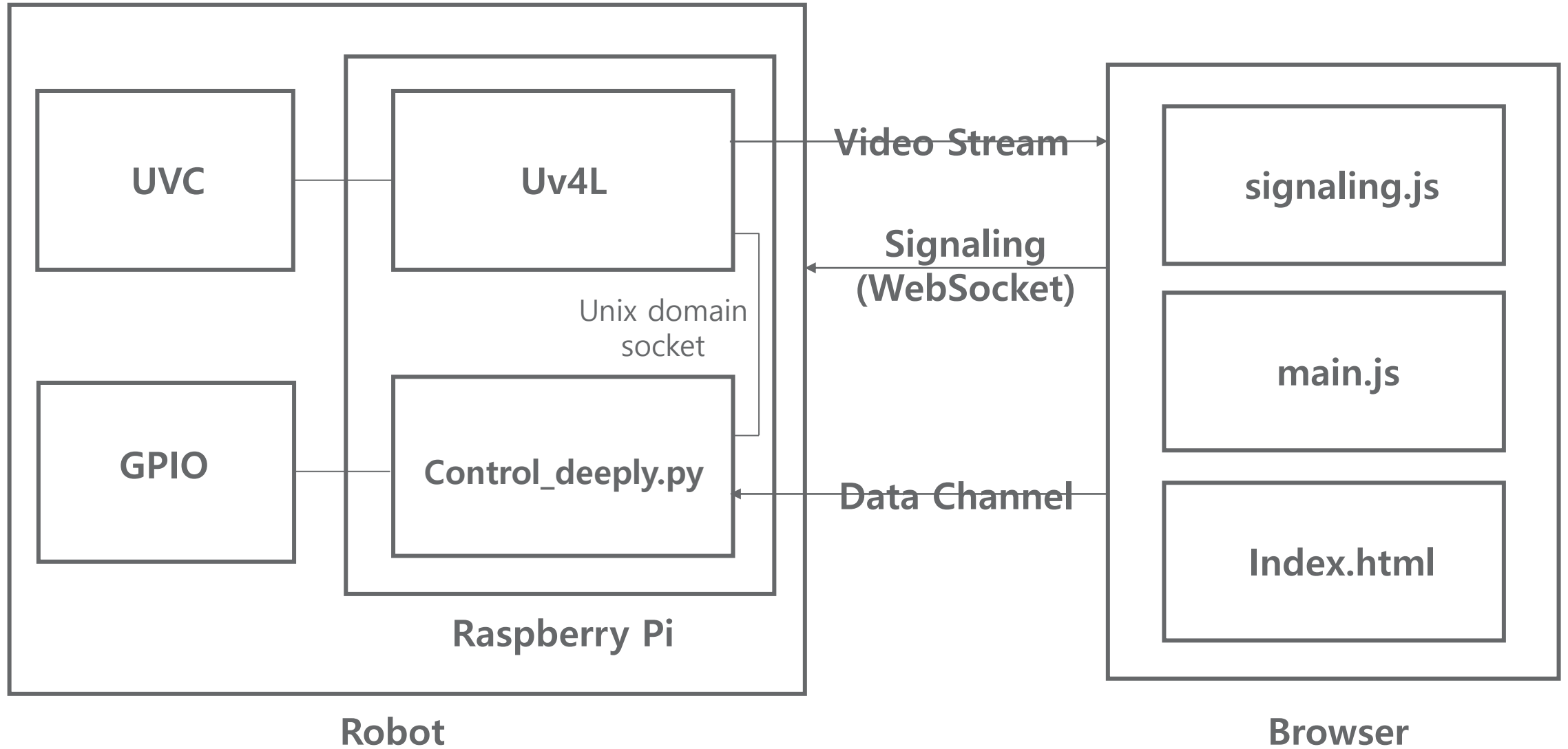


**Robot**



**Client**

## 2. Mechanism



## 2. PROJECT



초기화

비디오 스트림 불러오기

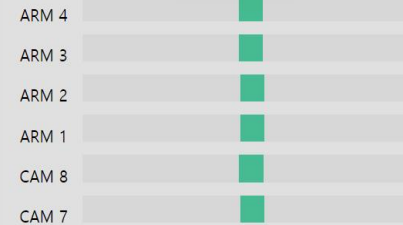
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ROBOT ARM 제어

CAMERA 제어

Face Detection



LOW HIGH

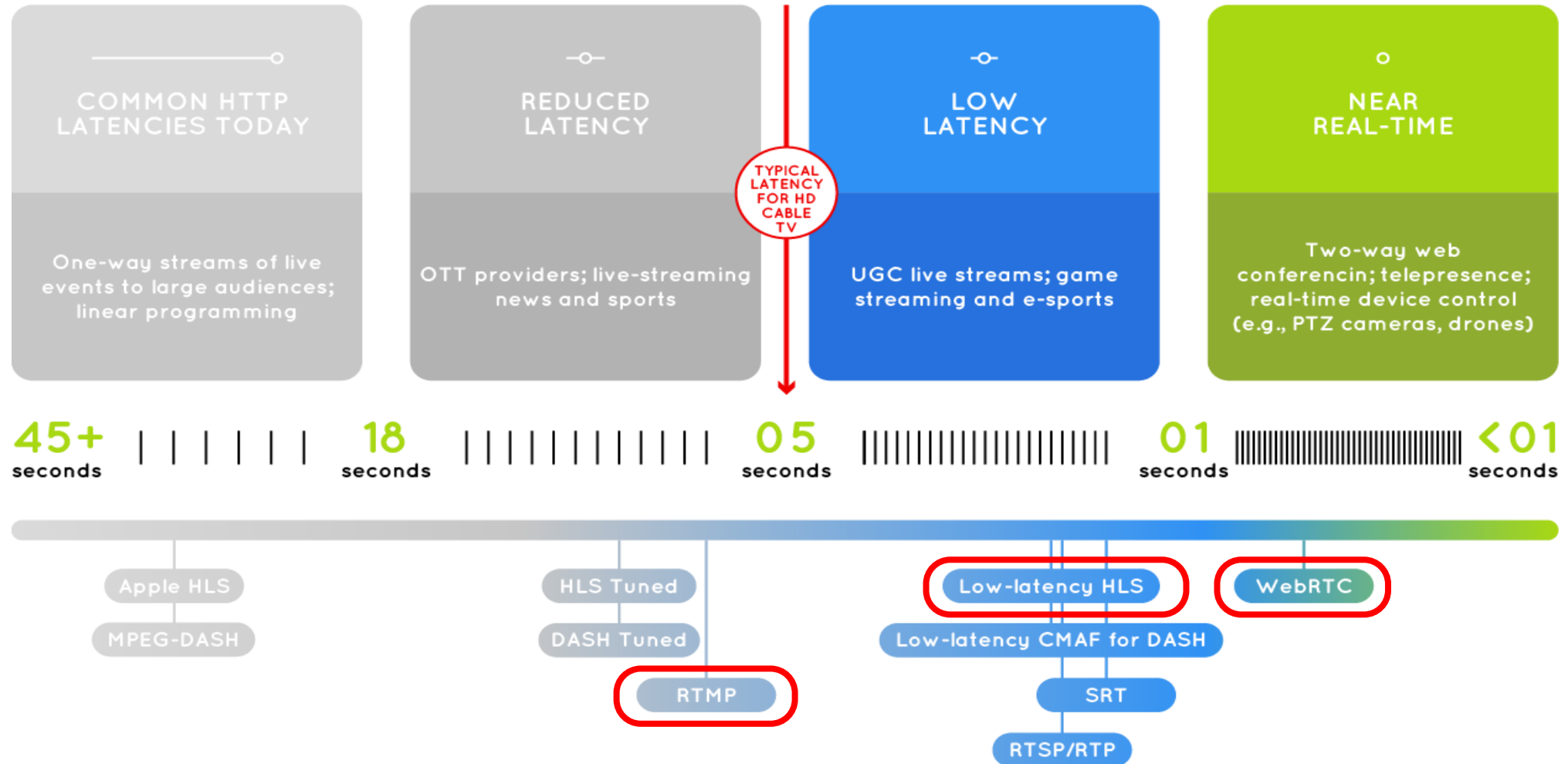


Speed 제어

방향키(키보드와 버튼 사용 가능)

### 3. 스트리밍 프로콜

#### Streaming Latency and interactivity continuum





### 3. 기대효과



**감사합니다**

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*Deeplly*