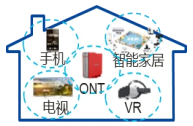
iBNG: Empowering Broadband Network Gateways with AI

Presenter ：Shengnan Yue (China Mobile)

iBNG: BNG with Intelligence Provided by AI

A broadband network transforms from an entertainment center to a intelligent diversified center



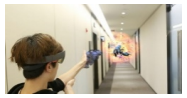
Home broadband
Enterprise broadband
Internet private line

Video conferencing

Cloud game

Spatial video

Stereoscopic video



Image/Text-to-image

Image/Video-to-video

DREAMIX

File download

Web browsing

Intelligent awareness and differentiated assurance are the basis

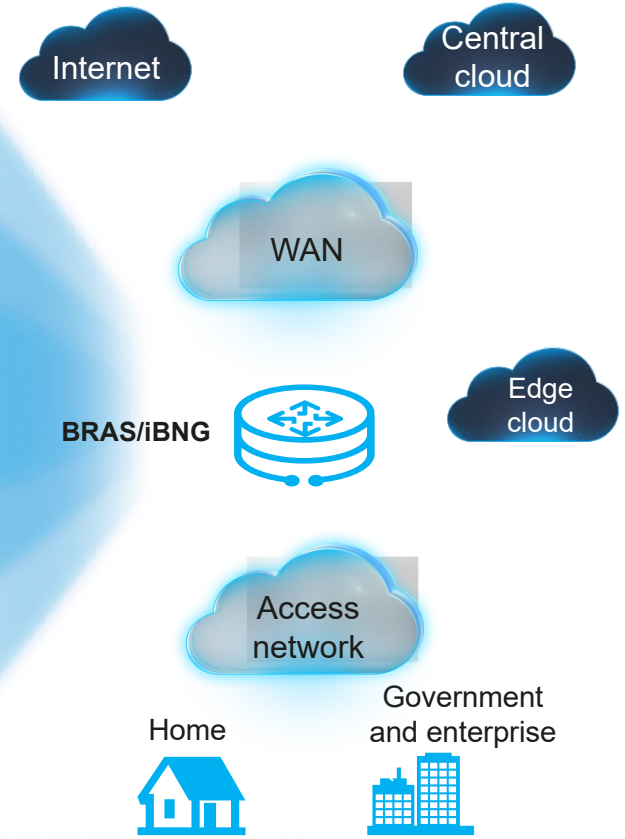
Strong-interaction services
Low traffic rate, sensitive to delay/jitter
Education, office, gaming

Big video services
High traffic rate, large burst, sensitive to packet loss
4K/8K, AR/VR, 360-degree view

Intelligent computing services
High throughput, high flexibility, servitization
Natural language, machine vision, generative AI

Common broadband services
Unordered services, insensitive to network KPIs
Internet access, download, OTT video

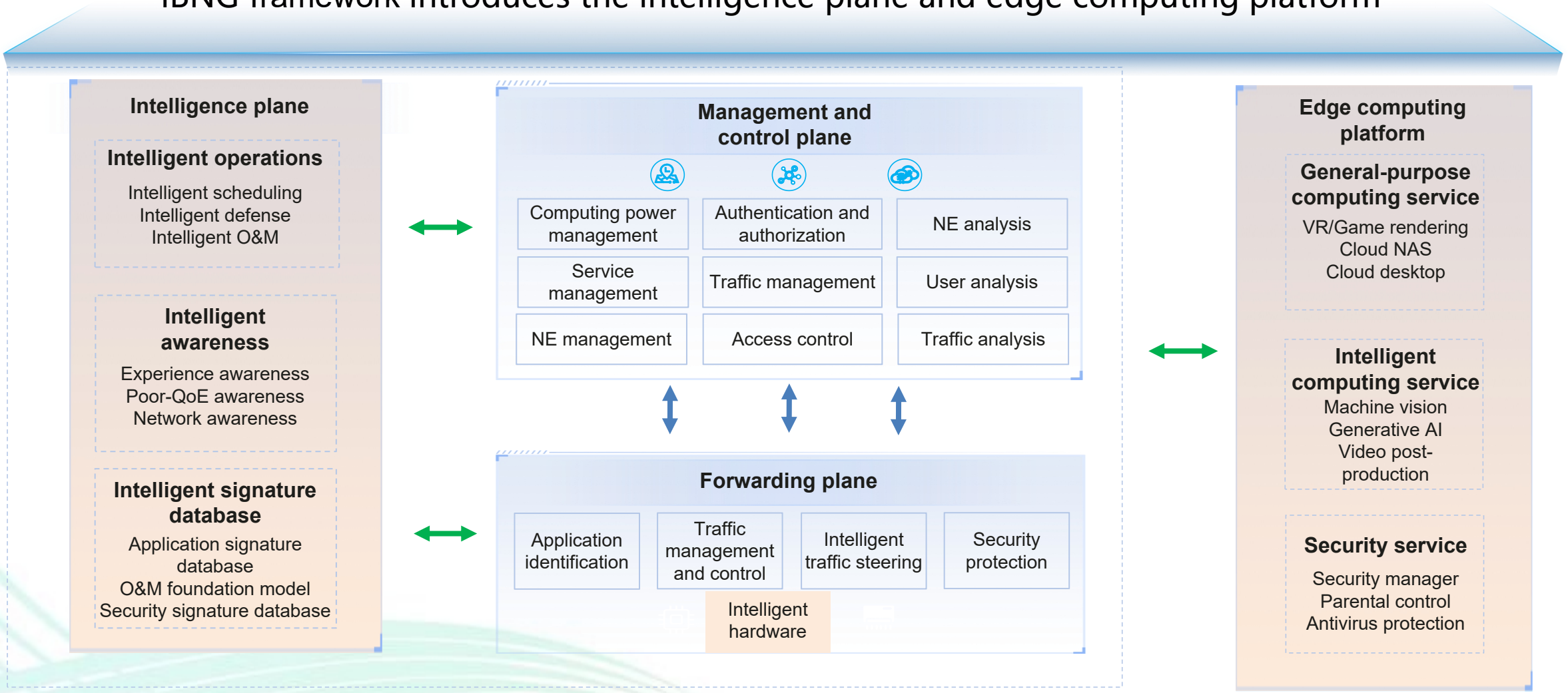
A BNG is the key anchor point for intelligent service development



BNG is connected to users in the downstream direction and to the Internet in the upstream direction. The intelligent evolution of the BNG directly affects the development of intelligent network services.

AI for Network Implementation Framework

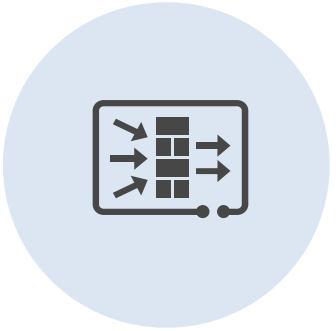
iBNG framework introduces the intelligence plane and edge computing platform



Requirement and Scenario of AI for Network

AI for Network Operations

AI for Network Service

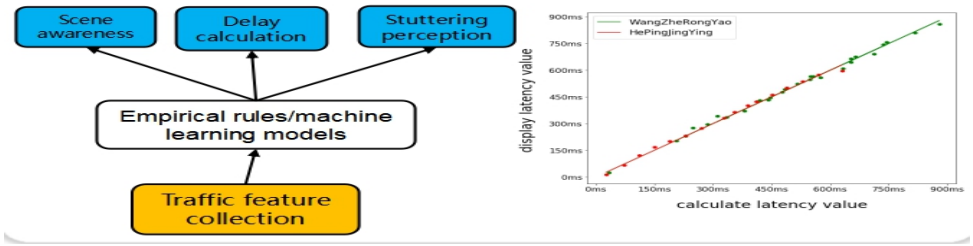


AI for Network Security

Key Technique 1: Intelligent User Service Quality Tracing and Management

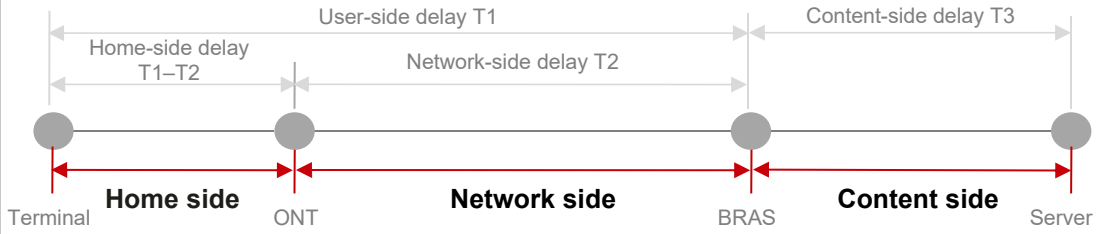
AI-based Identification: Intelligently perceive poor-QoE applications/users

- Building User Quality Perception Data Warehouse with a Computing Engine
- Multi-topology multi-source data spatiotemporal perception joint model
- User Perception Evaluation System



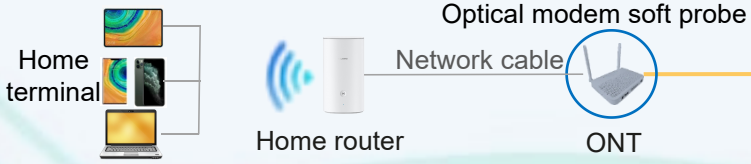
AI-based Demarcation: Intelligently analyze user experience data and network topology

- Intelligent analysis mechanism
- Analysis of Distribution Characteristics and Behavioral Patterns of Experience Data

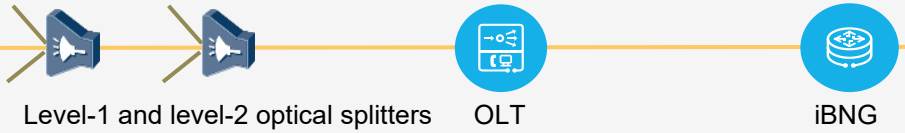


AI-based Location: Intelligently analyze root causes of poor QoE

Poor-QoE home locating



Poor-QoE ODN and NE locating

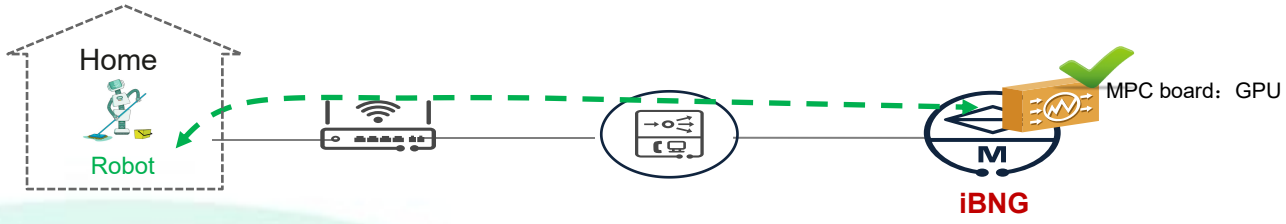


Poor-QoE content locating

Key Technique 2: computing platform for Home AI Services

iBNG's built-in computing intelligent platform provide containerization and openness capabilities, install third-party apps, and realize home intelligent value-added business services

- **Intelligent compute capability platform:**
  - ✓ Deep edge CPU, GPU
  - ✓ Containerized openness
  - ✓ Intelligent compute capability service APP
- **Home AI services:**
  - ✓ Intelligent compute capability provide low latency service
  - ✓ Like a remote control application for home nanny robots



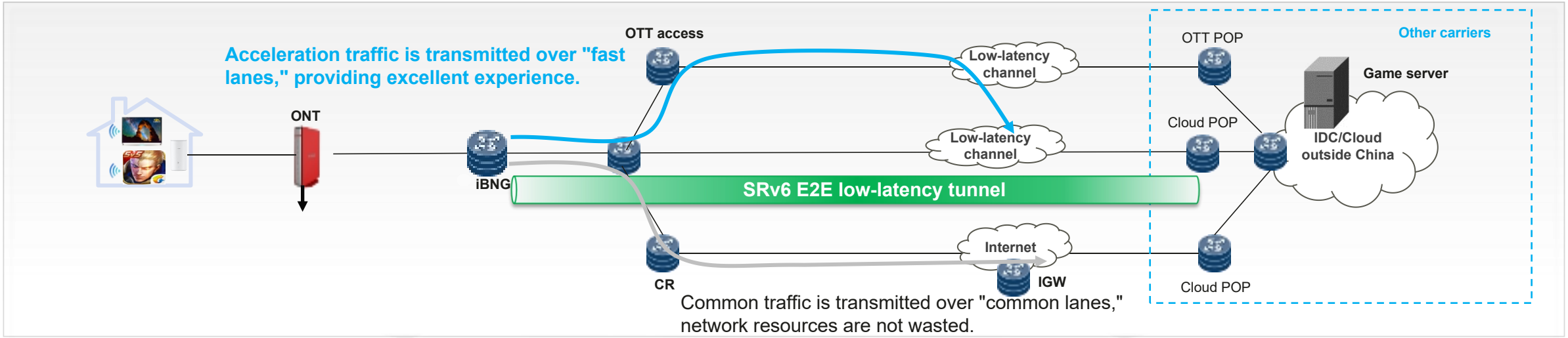
Key Technique 3: Intelligent Service Identification and Acceleration

iBNG's Intelligent Application Identification

- Comprehensive Layer 4 to Layer 7 Protocol Analysis
- Encrypted protocol fingerprint identification
- AI-based big data IP service portrait
- AI-based big data user behavior portrait

iBNG's Intelligent Application Acceleration

- AI-based precise application identification
- Multi-dimensional intelligent application identification
- Intelligent path selection for high-value applications
- Deterministic experience assurance, excellent and differentiated services



Signatures of Layer 4 to Layer 7 protocols

Traffic behavior analysis

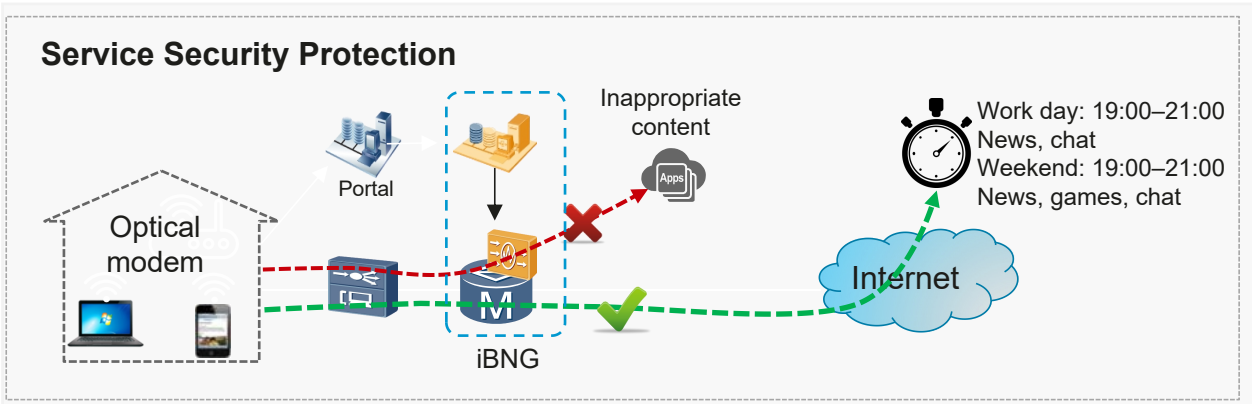
Fingerprint identification of encrypted applications

Asymmetric traffic protocol identification

Key Technique 4: AI-Based Service Security Protection

- Intelligent and precise application control based on application identification
- Parental control service to filter pornography- and violence-related website
- Defend against DDoS attacks
- Prevent malicious viruses and software

Powerful AI capabilities of Intelligent NE
Ensure Service Security



The iBNG controls access to websites and applications. All home terminals can be controlled.

- **Comprehensive protection:** The URL category database covers categories of harmful websites and supports continuous update.
- **Remote strong control:** The performance of home routers and terminals is not affected, and uninstallation, bypassing, and cracking are prevented.
- **Easy operation:** Users can customize Internet access policies (through apps/portals) at any time.
- **Flexible policies:** Users can flexibly customize Internet access policies based on website categories and time ranges.

Summary and Future Work

Current situation

- Launch MPC computing ability board with AI intelligence capability and built-in computing power
- Achieve key capabilities such as AI for operation and AI for security in laboratory
- Complete business trial of home cloud broadband and cloud esports in several provinces

Future Work

- Seek more opportunities in AI for service field to achieve the L4 full automation goal of AI for network.

Thanks