Azure के 4 Load-Balancers — एक नज़र में "पासा-पलट" टेबल

(इसे interview याद-sheet की तरह रख सकते हो)

Feature 🏷	Azure Load Balancer (Basic/Standard)	Azure Application Gateway (v2/WAF)	Azure Traffic Manager	Azure Front Door (Std/Premium)
OSI Layer / Protocol	L4 – TCP/UDP (no HTTP logic)	L7 – pure HTTP/HTTPS	DNS-level (name resolution)	L7 – HTTP/HTTPS only
Scope	**Regional** (एक region के अंदर)	**Regional**	**Global** DNS	**Global** edge (anycast POPs)
Backend मशीनें कहाँ?	VM/VMSS **same VNet**; single VNet per rule learn.microsoft.com	Any IP/FQDN reachable, लेकिन Gateway **dedicated subnet** में बैठता है learn.microsoft.comlearn.microsoft.com	कोई भी public-facing endpoint (Azure, on-prem, दूसरे cloud) learn.microsoft.com	Public IP/FQDN; Private Link केवल Premium edition
Same VNet/Availability-Set condition?	• Backend NICs same VNet • Per availability-set: max 1 Public + 1 Internal LB learn.microsoft.com	Gateway खुद dedicated subnet में; backend को same VNet होना **ज़रूरी नहीं** (public भी चलेगा)	VNet irrelevant (DNS answer देता है)	VNet irrelevant (Edge POP से public traffic)
Dedicated Subnet needed?	✕	☑ (GatewaySubnet-2) learn.microsoft.com	✕	✕
HTTP goodies (path-based, host-based, SSL offload, WAF)	कोई नहीं	✔ Path/host; SSL off/on; Optional WAF	✕ (DNS only)	✔ Path/host; Rules Engine; Built-in WAF; SSL certs auto-managed learn.microsoft.com

Feature 🏷	Azure Load Balancer (Basic/Standard)	Azure Application Gateway (v2/WAF)	Azure Traffic Manager	Azure Front Door (Std/Premium)
Global/Geo routing	✕ (क्लासिक regional)	✕ (regional)	✔ Performance, Priority, Weighted, Geographic, MultiValue policies learn.microsoft.com	✔ Anycast POP => nearest POP; can steer by latency/health
Private endpoints	Internal LB subnet-private	Private front-end via VNet integration	✕	Premium: Private Link origins
Health probing	TCP/HTTP/HTTPS probes	HTTP/HTTPS custom probes (+active/passive)	DNS checks, probe HTTP/HTTPS	HTTP/HTTPS health probes
Typical use-case	VM Scale Set या AKS internal traffic	Web app layer-7 routing + WAF	Region-level fail-over via DNS	Global web acceleration + WAF + CDN-style routing
Free-tier support?	Basic LB free	Not free (v2 billed per-capacity)	Free (traffic-based charges)	Not free (Std/Prm)
Remember	*Same VNet, layer-4 only*	*Dedicated subnet, layer-7 brain*	*DNS answer बदलता है, कोई TCP सेशन touch नहीं*	*Edge POP पर TLS offload, geo-wide smart routing*

- **Inside one VNet VM-to-VM? ➜ Azure Load Balancer.**
- **One region, path-based URL routing + WAF? ➜ Application Gateway.**
- **Cross-region fail-over via DNS? ➜ Traffic Manager.**
- **Globally distributed web front door + acceleration + WAF? ➜ Azure Front Door.**

Azure Backup Services – Default Retention Period Table (AZ-104 Ready)

#	Backup Type / Service	Data Source	Default Retention Period	Notes
1	**Azure VM Backup**	Azure VMs (Windows/Linux)	**30 days**	- Daily snapshot - Policy customizable: up to 99 years
2	**Azure File Share Backup**	Azure Storage (Files)	**30 days**	- Daily backup - Can go up to 10 years
3	**Azure Blob Backup (Preview)**	Block Blobs	**None by default**	- You define your own backup schedule and retention
4	**Azure SQL Database Backup**	Azure SQL DB / MI	**7 days** (Default) **Up to 35 days** (Basic/Svc/Std)	- Long-term retention (LTR) possible: **up to 10 years** with LTR policies
5	**Azure Backup Server (MABS)**	On-prem VMs/Files/Apps	**5 days** (daily) **2 weeks** (weekly) – by default	- Highly customizable: daily/weekly/monthly/yearly
6	**Microsoft Azure Recovery Services (MARS Agent)**	On-prem Servers (Files/Folder)	**30 days**	- Max retention: up to **3,360 days (~9 years)**
7	**Snapshot-only (Instant Restore)**	Azure VMs	**2 days** (default)	- Part of Azure Backup - Kept in staging location
8	**Azure Backup Vault - Soft Delete**	VM backups	**14 days** (Soft delete period)	- After deletion, recovery available for 14 days
9	**Azure Kubernetes Backup (via Azure Backup)**	AKS Persistent Volumes (Preview)	**7 days**	- Retention is configurable
10	**Azure Backup for SAP HANA**	SAP DB on Azure VMs	**30 days**	- Can go up to 10 years
11	**Recovery Services Vault - Item Retention**	Multiple sources	**Retention policy-driven**	- Default backup policies define retention at item-level

What is WAF in Azure Application Gateway?

WAF = Web Application Firewall
It's a **layer-7 (HTTP/HTTPS)** security feature in **Azure Application Gateway** that **protects your web applications** from common threats and attacks.

Key Features of WAF on Application Gateway:

Feature	Details
Deployment	WAF is available on **Application Gateway v2 SKU**
Protection Ruleset	Based on **OWASP Core Rule Set (CRS)** → Protects against: SQL injection, XSS, CSRF, command injection, etc.
Modes	1. **Detection mode** – logs alerts only 2. **Prevention mode** – actively blocks malicious traffic
Custom Rules	You can define your own match conditions (IP, headers, geo, etc.) to allow/block traffic
Logging	Logs are stored in Log Analytics, Storage, or Event Hub (Diagnostic settings)
Monitoring	Integrated with Azure Monitor; shows WAF logs, matches, and rule hits
Exclusions	Can exclude certain paths, params, headers from rules
Geo-filtering	You can block/allow traffic by country using custom rules
Autoscaling	App Gateway WAF v2 supports autoscaling and zone redundancy

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SKUs That Support WAF:

SKU	WAF Support	Notes
Application Gateway v1	✗ No	WAF not supported
Application Gateway v2	☑ Yes	Required for WAF
Application Gateway WAF v2	☑ Yes	WAF-enabled version

Common WAF Use Cases

- Protect public web apps from common attacks
- Filter traffic based on country, IP, headers
- Stop bot traffic and known bad patterns
- Compliance (OWASP, PCI-DSS, etc.)

💡 Exam/Interview Tips (AZ-104):

- WAF works only on **Application Gateway v2** SKU.
- **Prevention mode** is used to **actively block** suspicious traffic.
- Uses **OWASP Core Rule Set (CRS)**.
- WAF can be **integrated with Azure Front Door** too (global WAF).

WAF does not protect VMs directly **— only web layer (L7 traffic).**

🛡️ WAF (Web Application Firewall) vs 🔥 Azure Firewall

Feature	WAF (on App Gateway)	Azure Firewall
🔍 **Layer**	**Layer 7** (HTTP/HTTPS)	**Layer 3–4–7** (network, transport, some app protocols)
🧠 **Focus**	Protect **web apps** (HTTP/HTTPS) from OWASP attacks like SQLi, XSS, CSRF	Control **all outbound/inbound** traffic: any protocol (HTTP, RDP, DNS, SSH, SMB, etc.)
🌐 **Scope**	Works only for **HTTP/S apps** behind App Gateway	Applies to **entire VNet or subnet** — VMs, containers, etc.
⚙️ **Protocols supported**	HTTP / HTTPS	Any TCP/UDP + FQDN rules (HTTP, HTTPS, RDP, SSH, DNS, etc.)
🛡️ **Use case**	Secure web apps	Network-level firewall for **non-web traffic** + **centralized** control
🎯 **Granularity**	Request path, headers, cookies	Source/dest IP, port, protocol, FQDN
🧩 **Integration**	Tied to Application Gateway only	Works with **all network traffic** in a VNet
💰 **Pricing**	App Gateway + WAF pricing	Azure Firewall (per-hour + per-GB)

🧠 Example Scenarios

Scenario	Use WAF?	Use Azure Firewall?
Web app (HTTPS) exposed to internet	✅ Yes	❌ Maybe not
VMs need to browse internet (outbound control)	❌ No	✅ Yes

Scenario	Use WAF?	Use Azure Firewall?
Block specific countries from web app	✅ Yes (WAF custom rule)	✅ Optional
Secure RDP/SSH access from only 1 IP	❌ No	✅ Yes
Stop SQL injection/XSS	✅ Yes	❌ No
Enforce FQDN-based outbound rules (e.g., only allow `*.microsoft.com`)	❌ No	✅ Yes

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📌 Final Verdict

✅ **Use WAF when you want to secure your web applications (HTTP/HTTPS) against common threats.**
✅ **Use Azure Firewall when you need to control/monitor network-level traffic (RDP, SSH, DNS, etc.) across your VNet.**

➡️ So, **WAF ≠ Azure Firewall**.
If your architecture includes **web apps + backend VMs**, you'll often use **both together**:

```
csharp
CopyEdit
[User] → App Gateway (WAF) → Web App / API
                                ↓
                          Azure Firewall
                                ↓
                        Backend Subnet VMs
```

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🎯 Example Scenarios = ✅ Outbound Traffic

क्या हो रहा है	Traffic Direction
VM ne Stripe/PayPal API se payment verify kiya	✅ Outbound
VM ne Azure Blob Storage se image fetch kiya	✅ Outbound
VM ne weather API se data liya user ko dikhाने के लिए	✅ Outbound
VM ne Linux update ke लिए internet से package download किया	✅ Outbound
App ne SendGrid se email bhejna initiate किया	✅ Outbound

🌍 Internet

↓

[App Gateway + WAF] ←— HTTP/S web traffic

↓

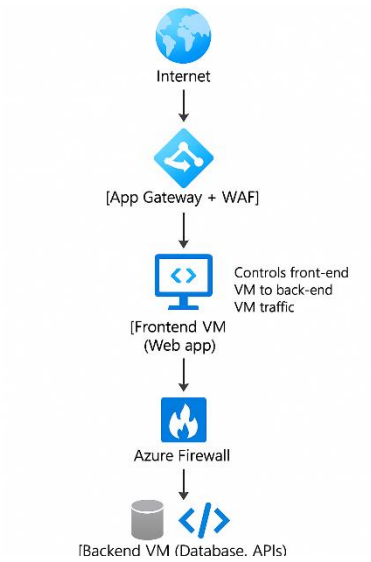
[Frontend VM (Web app)]

↓

[Azure Firewall] ←— Controls front-end VM to back-end VM traffic

↓

[Backend VM (Database, APIs)]



◈ Scenario 1 – "Classic 3-tier with App Gateway + WAF and Azure Firewall"

```
pgsql
CopyEdit
🌍 Internet
   │  (HTTPS 443)
┌──▼──────────────────────────┐
│ App Gateway (+ WAF v2 SKU)  │   ◈ SQL-i / XSS inspection
└─────────────────────────────┘
   │  (HTTP → Backend Pool-A)
┌──▼──────────────┐
│ Front-end VMSS  │   ◈ NSG-FE (allow 80/443 from AgW)
└─────────────────┘
   │  (Port 8080 internal)
┌──▼──────────────────────────┐
│ 🔥 Azure Firewall           │   ◈ L3/L4 rules, FQDN filtering
└─────────────────────────────┘
   │  (1433, 5671…)
┌──▼──────────────┐
│ Back-end VMSS   │   ◈ NSG-BE (allow only from FW ASG-FE)
└─────────────────┘
```

◈ Scenario 2 – Same as #1 plus Azure Bastion for management

```
scss
CopyEdit
                                        (RDP/SSH via browser)
🌍 Admin PC──────────────▶🌐
                  │
                  ▼
              ┌──────────────┐
              │ Azure Bastion │   placed in Mgmt subnet
              └──────────────┘
                  │ (RDP 3389 / SSH 22 *within* VNet)
     <— (same flow as Scenario 1 below) —>
```

Why: No public IPs on VMs; admins connect over Bastion. Add **NSG-Mgmt** to allow TCP 443 from corporate IPs only.

◈ Scenario 3 – App Gateway + WAF only (no Firewall) – small stateless site

```
sql
CopyEdit
🌍 Internet
   │
┌──▼──────────────────┐
│ App Gateway + WAF   │
```

```
└──────────────────────┘
   │
   ▼
┌──────────────┐
│ Web VMSS     │    ◈ NSG-Web (allow 80/443 only from AgW)
└──────────────┘
```

Use when: Pure web traffic, no complex back-end or outbound restrictions. Cheaper & simpler than adding Firewall.

◈ Scenario 4 – Azure Firewall DNAT (no App Gateway) – lift-and-shift VM farm

```
pgsql
CopyEdit
🌍 Internet
   │  Public-IP:443 ──► DNAT → 10.0.1.4:443
   ▼
┌──────────────────────┐
│ 🔥 Azure Firewall    │
└──────────────────────┘
   │
   ▼
┌──────────────┐
│ Web VM NIC   │    ◈ NSG (allow only from Firewall)
└──────────────┘
```

When to use: Mixed protocols (HTTPS, RDP, SFTP) and you only need L3/L4 control; no WAF logic required.

◈ Scenario 5 – Global web: Azure Front Door + WAF, regional App Gateway, internal Firewall

```
scss
CopyEdit
🌍 Internet
   │
   ▼
┌──────────────────────────────┐
│ Azure Front Door (+WAF)      │  Anycast POPs, TLS offload
└──────────────────────────────┘
   │ (Origin = regional AgW VIP)
   ▼
┌──────────────────────────────┐
│ App Gateway (in region)      │  Path-based → micro-services
└──────────────────────────────┘
   │
   ▼
┌──────────────────────────────┐
│ 🔥 Azure Firewall            │  Outbound + east-west
└──────────────────────────────┘
   │
   ▼
┌──────────────┐   ┌──────────────┐
│ API VMSS     │   │ DB PaaS      │   ◈ ASG-API, ASG-DB for policy
└──────────────┘   └──────────────┘
```

Why: Need global acceleration + centralized WAF (Front Door), regional app-layer routing (AgW), and full network security (Firewall).

🔑 Where NSG & ASG fit

Layer	Typical NSG / ASG Rule
NSG-Internet-Subnet	Deny all inbound (only FDoor/AgW public IPs allowed)
NSG-FE (front-end)	Allow 80/443 from AgW subnet only; Deny all else
NSG-BE (back-end)	Allow SQL/from **ASG-FE**; Deny internet
ASG-FE / ASG-API / ASG-DB	Logical grouping so Firewall/NSG rules stay readable