

	Co	ombined Comp	arison of both	High and Low	level framewor	ks	
uilt-in (no additional or minimal Supported (little required):		from the same Requires a third party service. A compatible one is easily found.		Not supported at all. Third party libraries and custom solutions do not work with the framework.	Uncertain. Requires further research.	Not applicable or not needed	
General	Mirror	Photon Unity Networking 2	Photon Bolt	Forge Networking Remastered	Dark Rift 2	MLAPI	SmartFoxServer 2X
Networking Model	Client/Server	Client/Client Initial setup wizard. PhotonView	Client/Server	Client/Server	Client/Server Message events, Plugins. Client and	Client/Server	Client / Authoritative Server
Unity Integration	Mirror components.	components	Bolt Wizard. Bolt components.	Forge Wizard. Forge components.	Server components	MLAPI components	DLL providing API
Highest possible authority	Dedicated server	Master client (1 player) Always possible for the Master	Dedicated server	Dedicated server	Dedicated server	Dedicated server	Dedicated server Minimal, with custom server sid
Ease of client hacking	Minimal with dedicated server setup Not built-in. Requires self	Client unless Photon Server is used	Minimal with dedicated server setup Not built-in. Requires self	Minimal with dedicated server setup Not built-in. Requires self	Minimal with dedicated server setup Not built-in. Requires self	Minimal with dedicated server setup Not built-in. Requires self	validation of client requests
Host Migration	development development	Built-in	development development	development	development	development	Not applicable
Versioning (players of different versions separated)	Supported	Built-in	Supported	Supported	Supported	Supported	Supported
Network callbacks	Built-in	Built-in	Built-in	Built-in	Supported	Built-in	Built-in
Source Code	Open Source	Low level closed. High level open.	Closed Source (might be able to request under certain conditions)	Open Source	Available in paid version	Open Source	Closed Source
Built-in Physics Features/Support	?	?	?	?	?	?	Not supported
Cross-Platform	Desktop, Web, Mobile, Console	Desktop, Web, Mobile, Console	Desktop, Mobile, Console	Desktop, Web, Mobile, Console	Desktop, Mobile, Console, Web (custom listener required)	Desktop, Web, Mobile, Console	Desktop, Web, Mobile, Conso
Web-based administration tool					(custom isteller required)		Built-in
Integrated direct database							Built-in
connectivity Analytics for business statistics							Built-in
		Distance Helbert Networking 0	Distant Date	F N-4	DI-DW-0	MLAPI	
Hosting Features/Platform	Mirror Dedicated Servers, Client hosted,	Photon Unity Networking 2 Photon Cloud or your own Photon	Photon Bolt Dedicated Servers, Client hosted,	Forge Networking Remastered Dedicated Servers, Client hosted,	Dark Rift 2 Dedicated Servers, Listen Server,	Dedicated Servers, Listen Server,	SmartFoxServer 2X
Hosting	Local LAN / Wifi TCP, UDP, WebSockets, Steam,	Servers.	P2P, Local LAN / Wifi	P2P, Local LAN / Wifi	Local LAN / Wifi Bi-channel UDP/TCP, Customizable	Local LAN / Wifi TCP, UDP, WebSockets, Steam,	Dedicated server TCP, UDP, WS, WSS,
Transport layer protocols	Custom	RUDP, TCP, WebSockets	UDP (?)	UDP/RUDP	(steam, custom, websockets)	Custom	HTTP tunneling
Dedicated Game Servers	Built-in	Photon Servers for additional cost	Built-in	Built-in	Built-in	Built-in	Built-in
Listen Servers	Built-in	Built-in	Built-in	Built-in (self-hosted)	Built-in	Built-in	Built-in
Relay Servers	Requires 3rd party services	Built-in (with best region selection)	Built-in	Requires 3rd party services	Requires 3rd party services (steamworks)	Provided as a separate free service	Not applicable
Peer to Peer (P2P)	Not supported	Not supported	Built-in (?)	Steamworks P2P integration (?)	Not built-in. Requires self development	Built-in (Steam P2P)	Not supported
NAT punchthrough	Requires 3rd party services (steam api)	Not needed	Built-in	Built-in (self-hosted)	Requires 3rd party services (steam	Provided as a separate free service	Not applicable
LAN support	apı) Built-in	Not supported	Built-in. Internet required for initial	Built-in	api) Built-in	Built-in	Built-in
Offline mode (single player)	Built-in	Built-in	connection. Costs to circumvent. Built-in	Built-in			Not applicable
					Dulla la	Duitt to	
Headless Server	Built-in	Photon Servers for additional cost	Built-in	Built-in	Built-in	Built-in	Built-in
Direct IP Connection	Built-in	Not supported	Built-in	Built-in	Built-in Not built-in. Requires self	Built-in Supported (depends on the used	Built-in
Multicast (lan discovery)	Built-in	Not supported	Built-in	Built-in	development	transport)	Not applicable
Server Plugins		Photon Servers for additional cost	Photon Servers for additional cost		Built-in		Extensions (custom server side game logi
Matchmaking	Mirror	Photon Unity Networking 2	Photon Bolt	Forge Networking Remastered	Dark Rift 2	MLAPI	SmartFoxServer 2X
Matchmaking	Provided as a separate service	Built-in	Built-in	Not built-in. Requires self development or a 3rd party solution.	Provided as a separate service (requires Pro version)		Built-in
Room list	Provided as a separate service	Built-in	Built-in	Built-in	Not built-in. Requires self development		Built-in
Player Lobbies (ability to	Built-in	Not built-in. Requires self	Not built-in. Requires self	Built-in (is communication possible?)	Not built-in. Requires self		Built-in
communicate) com List Lobbies (rooms grouped	Provided as a separate service	development (?) Built-in	development (?) Built-in Filtering	Built-in	development Provided as a separate service		Built-in
by filters) ustom Room options (player count,		Built-in	Built-in	Built-in	(requires Pro version) Provided as a separate service		Built-in
room visibility, other config) Custom Matchmaking properties	Provided as a separate service				(requires Pro version) Provided as a separate service		
and filters lot Reservation (allows only certain	Provided as a separate service	Built-in	Built-in Filtering Built-in (accept and refuse certain	Built-in	(requires Pro version) Not built-in, Requires self		Built-in
players to join)	Provided as a separate service	Built-in	connections)	Built-in (ability to ban is available)	development		Built-in
Invitations and challenges system							Built-in
In-Game	Mirror	Photon Unity Networking 2	Photon Bolt	Forge Networking Remastered	Dark Rift 2	MLAPI	SmartFoxServer 2X
Synchronize variables		Command/RPC, Events,	Bolt Wizard, Commands		Messages/Events,	NetworkedVar, Messaging System	
*	Syncvars, Command/RPCs, Events	OnSerializePhotonView		Forge Wizard, RPCs Not built-in. Requires self	IDarkRiftSerializable		Built-in Not built-in. Requires self
Animation synchronization	Built-in Built-in (Network Messages,	Built-in	Built-in	development	Supported		development
Custom Networked Events	SyncEvent)	Built-in	Built-in (global and targetted)	Built-in	Built-in	Built-in	Built-in
Commands & RPCs	Commands & RPCs	RPCs	Commands/Events	RPCs	MessageReceived/Send Message	ServerRPC and ClientRPC	Built-in
Message target selection (events, RPCs)	Built-in (fully custom)	Built-in (fully custom)	Built-in (fully custom)	Built-in (fully custom)	Built-in (fully custom)	Built-in (fully custom)	Built-in
sustom Properties (arbitrary values available to everyone)	Supported. SyncVars (lists, dicts, sets)	Built-in (RoomProperties)	Built-in (RoomProperties)	Supported	Supported	Supported	Built-in
Networked/Synchronized Timestamp	Built-in	Built-in	Not built-in(?)	Not built-in(?)	Supported	Built-in	Not built-in. Requires self development
Interest Groups/Visibility	Built-in	Built-in	Built-in	Built-in	Not built-in. Requires self	Built-in	Built-in
Custom Type Serialization (non	Built-in	Built-in	Built-in (Stream Bytes)	Built-in	development (in roadmap) Built-in	Built-in	Built-in
RPC) Networked Object Pooling	Supported	Built-in	Built-in (customizable)	Supported	Supported	Built-in	Not applicable
				Supported			
Send Rate Customization	Built-in	Built-in	Built-in		Supported	Built-in	Supported
Synchronized map loading	Built-in	Built-in	Built-in	Built-in	Supported	Built-in	Not applicable
Entity Ownership/Control Transfer	Built-in	Built-in	Built-in	Built-in	Supported	Built-in	Supported
Additive Scene Loading	Built-in	Supported	Supported	Built-in	Supported		Not applicable
Physics Scenes	Built-in	Not built-in. Requires self development (?)	Not built-in. Requires self development (?)	Not built-in. Requires self development (?)	Supported		Not applicable
Ban Clients	Supported			Built-in	Built-in (strike system)		Built-in
Spawn Management (Network Objects)	Built-in	Built-in	Built-in	Built-in	Not built-in. Requires self development	Built-in	Not applicable
RPC Return values					Not built-in. Requires self	Built-in	Built-in
					development		Built-in
Dynamically create game Pooms							Built-in
	I.						
Public and private chat messaging		i e	1				Built-in
Public and private chat messaging dministrator / Moderator messages				i de la companya de	I	I	Built-in
Dynamically create game Rooms Public and private chat messaging dministrator / Moderator messages Moderator support (kick / ban actions)							
Public and private chat messaging dministrator / Moderator messages Moderator support (kick / ban actions) Flooding filter with auto-kick / auto- ban functions							Built-in
Public and private chat messaging dministrator / Moderator messages Moderator support (kick / ban actions) Flooding filter with auto-kick / ban functions Bad words filter with auto-kick /							Built-in Built-in
Public and private chat messaging dministrator / Moderator messages Moderator support (kick / ban actions) Flooding filter with auto-kick / auto- ban functions							
Public and private chat messaging dministrator / Moderator messages Moderator support (kick / ban actions) ilooding filter with auto-kick / auto- ban functions Bad words filter with auto-kick / auto-ban functions Persistent banned users list							Built-in
public and private chat messaging diministrator / Moderator messages Moderator support (kick / ban actions) looding filter with auto-kick / auto-ban functions Bad words filter with auto-kick / auto-ban functions Persistent banned users list Persistent Buddy List system							Built-in Built-in Built-in
nublic and private chat messaging dministrator / Moderator messages Moderator support (kick / ban actions) tooding filter with auto-kick / auto-ban functions Bad words filter with auto-kick / auto-ban functions Persistent banned users list							Built-in Built-in

Gameрiay Specific	MILLOL	Pnoton Unity Networking 2	Prioton Bolt	Forge Networking Remastered	Dark Kiπ ∠	MLAPI	Smarr-oxServer ZA
Rewinding	Not built-in. Requires self development (?)	Not built-in. Requires self development (?)	Built-in hitbox rewinding	Built-in	Not built-in. Requires self development		Requires self development
Lag Compensation	Not built-in. Requires self development (?)	Not built-in. Requires self development (?)	Built-in		Not built-in. Requires self development	Built-in	Requires self development
Client side prediction	Not built-in. Requires self development (?)	Not built-in. Requires self development (?)	Built-in		Not built-in. Requires self development		Requires self development
Authoritative Movement	Supported	Supported	Built-in	Supported	Supported	Supported	Supported
Interpolation/Extrapolation	Built-in and customizable	Built-in and customizable	Built-in, not customizable (?)	Built-in and customizable	Supported	Supported	Requires self development
Reconnection system for unstable clients							Built-in
Dedicated MMO features							Built-in

			High Level I	rameworks			
uilt-in (no additional or minimal supported (little required):	dev time Provided as an additional service to developers. Or support/built-in but	rom the same Requires a third party service. A compatible one is easily found.	Not built-in. Is supported but requires a lot of development time or a third party solution.		Uncertain. Requires further research.	Not applicable or not needed	
General	Mirror	Photon Unity Networking 2	Photon Bolt	Forge Networking Remastered Client/Server	MLAPI	SmartFoxServer 2X	
Networking Model Unity Integration	Client/Server	Client/Client Initial setup wizard. PhotonView	Client/Server Bolt Wizard. Bolt components.		Client/Server	Client / Authoritative Server	
Highest possible authority	Mirror components.	components	Bolt Wizard. Bolt components. Dedicated server	Forge Wizard. Forge components. Dedicated server	MLAPI components	DLL providing API	
Ease of client hacking	Dedicated server Minimal with dedicated server setup	Master client (1 player) Always possible for the Master	Minimal with dedicated server setup	Minimal with dedicated server setup	Dedicated server Minimal with dedicated server setup	Dedicated server Minimal, with custom server side	
*	Not built-in. Requires self	Client unless Photon Server is used	Not built-in. Requires self	Not built-in. Requires self	Not built-in. Requires self	validation of client requests	
Host Migration Versioning (players of different	development	Built-in	development	development	development	Not applicable	
versions separated) Network callbacks	Supported Built-in	Built-in	Supported Built-in	Supported Built-in	Supported Built-in	Supported Built-in	
Source Code	Open Source	Low level closed. High level open.	Closed Source (might be able to	Open Source	Open Source	Closed Source	
Built-in Physics Features/Support	Open Source	2	request under certain conditions)	Open Source	Open Source	Not supported	
Cross-Platform	Pesktop, Web, Mobile, Console	Desktop, Web, Mobile, Console	Desktop, Mobile, Console	Pesktop, Web, Mobile, Console	Pesktop, Web, Mobile, Console	Desktop, Web, Mobile, Console	
Web-based administration tool	Desklop, Web, Mobile, Collsole	Desktop, Web, Mobile, Console	Desktop, Mobile, Console	Desktop, Web, Mobile, Collsole	Desklop, Web, Mobile, Collisole	Built-in	
Integrated direct database						Built-in	
connectivity Analytics for business statistics						Built-in	
Hosting Features/Platform	Mirror	Photon Unity Networking 2	Photon Bolt	Forge Networking Remastered	MLAPI	SmartFoxServer 2X	
Hosting Hosting	Dedicated Servers, Client hosted.	Photon Cloud or your own Photon	Dedicated Servers, Client hosted,	Dedicated Servers, Client hosted.	Dedicated Servers, Listen Server,	Dedicated server	
-	Local LAN / Wifi TCP, UDP, WebSockets, Steam,	Servers. RUDP, TCP, WebSockets	P2P, Local LAN / Wifi UDP (?)	P2P, Local LAN / Wifi UDP/RUDP	Local LAN / Wifi TCP, UDP, WebSockets, Steam,	TCP, UDP, WS, WSS,	
Transport layer protocols	Custom		ODP (?)	Built-in	Custom Built-in	HTTP tunneling	
Dedicated Game Servers Listen Servers	Built-in Built-in	Photon Servers for additional cost Built-in	Built-in Built-in	Built-in Built-in (self-hosted)	Built-in Built-in	Built-in Built-in	
Relay Servers	Requires 3rd party services	Built-in (with best region selection)	Built-in	Requires 3rd party services	Provided as a separate free service	Not applicable	
Peer to Peer (P2P)	Not supported Requires 3rd party services (steam	Not supported	Built-in (?)	Steamworks P2P integration (?)	Built-in (Steam P2P)	Not supported	
NAT punchthrough	api)	Not needed	Built-in Built-in, Internet required for initial	Built-in (self-hosted)	Provided as a separate free service	Not applicable	
LAN support	Built-in	Not supported	connection. Costs to circumvent.	Built-in	Built-in	Built-in	
Offline mode (single player)	Built-in	Built-in	Built-in	Built-in		Not applicable	
Headless Server	Built-in	Photon Servers for additional cost	Built-in	Built-in	Built-in	Built-in	
Direct IP Connection	Built-in	Not supported	Built-in	Built-in	Built-in	Built-in	
Multicast (lan discovery)	Built-in	Not supported	Built-in	Built-in	Supported (depends on the used transport)	Not applicable	
Server Plugins		Photon Servers for additional cost	Photon Servers for additional cost			Extensions (custom server side game logic)	
Matchmaking	Mirror	Photon Unity Networking 2	Photon Bolt	Forge Networking Remastered	MLAPI	SmartFoxServer 2X	
Matchmaking	Provided as a separate service	Built-in	Built-in	Not built-in. Requires self development or a 3rd party solution.		Built-in	
Room list	Provided as a separate service	Built-in	Built-in	Built-in		Built-in	
Player Lobbies (ability to communicate)	Built-in	Not built-in. Requires self development (?)	Not built-in. Requires self development (?)	Built-in (is communication possible?)		Built-in	
oom List Lobbies (rooms grouped by filters)	Provided as a separate service	Built-in	Built-in Filtering	Built-in		Built-in	
ustom Room options (player count, room visibility, other config)	Provided as a separate service	Built-in	Built-in	Built-in		Built-in	
Custom Matchmaking properties and filters	Provided as a separate service	Built-in	Built-in Filtering	Built-in		Built-in	
ot Reservation (allows only certain players to join)	Provided as a separate service	Built-in	Built-in (accept and refuse certain connections)	Built-in (ability to ban is available)		Built-in	
In-Game	Mirror	Photon Unity Networking 2	Photon Bolt	Forge Networking Remastered	MLAPI	SmartFoxServer 2X	
Synchronize variables	Syncvars, Command/RPCs, Events	Command/RPC, Events, OnSerializePhotonView	Bolt Wizard, Commands	Forge Wizard, RPCs	NetworkedVar, Messaging System	Built-in	
Animation synchronization	Built-in	Built-in	Built-in	Not built-in. Requires self development	Built-in	Not built-in. Requires self development	
Custom Networked Events	Built-in (Network Messages,	Built-in	Built-in (global and targetted)	Built-in	Built-in	Built-in	
Commands & RPCs	SyncEvent) Commands & RPCs	RPCs	Commands/Events	RPCs	ServerRPC and ClientRPC	Built-in	
Message target selection (events,	Built-in (fully custom)	Built-in (fully custom)	Built-in (fully custom)	Built-in (fully custom)	Built-in (fully custom)	Built-in	
RPCs) ustom Properties (arbitrary values	Supported. SyncVars (lists, dicts,	Built-in (RoomProperties)	Built-in (RoomProperties)	Supported	Supported	Built-in	
available to everyone) Networked/Synchronized	sets) Built-in	Built-in	Not built-in(?)	Not built-in(?)	Built-in	Not built-in. Requires self	
Timestamp Interest Groups/Visibility	Built-in	Built-in	Built-in	Built-in	Built-in	development Built-in	
Custom Type Serialization (non	Built-in Built-in	Built-in	Built-in Built-in (Stream Bytes)	Built-in Built-in	Built-in Built-in	Built-in Built-in	
RPC)						Not applicable	
Networked Object Pooling	Supported	Built-in Built-in	Built-in (customizable) Built-in	Supported	Built-in		
Send Rate Customization	Built-in			Positivity.	Built-in	Supported	
Synchronized map loading	Built-in	Built-in	Built-in	Built-in	Built-in	Not applicable	
intity Ownership/Control Transfer	Built-in	Built-in	Built-in	Built-in	Built-in	Supported	
Additive Scene Loading	Built-in	Supported Not built-in. Requires self	Supported Not built-in. Requires self	Built-in Not built-in. Requires self		Not applicable	
Physics Scenes	Built-in	development (?)	development (?)	development (?)		Not applicable	
Ban Clients	Supported			Built-in		Built-in	
Spawn Management (Network Objects)	Built-in	Built-in	Built-in	Built-in	Built-in	Not applicable	
RPC Return values					Built-in	Built-in	
ynamically create game Rooms						Built-in	
ublic and private chat messaging						Built-in	
Iministrator / Moderator messages						Built-in	
Moderator support (kick / ban actions)						Built-in	
looding filter with auto-kick / auto- ban functions						Built-in	
						Built-in	
						Built-in	
auto-ban functions Persistent banned users list				·			
Persistent banned users list						Built-in	
auto-ban functions						Built-in Built-in	
auto-ban functions Persistent banned users list Persistent Buddy List system							

Gamepiay Specific	MILLOL	Pnoton Unity Networking 2	Prioton Boit	Forge Networking Remastered	MLAPI	SmartroxServer 4A	1 1 1
Rewinding	Not built-in. Requires self development (?)	Not built-in. Requires self development (?)	Built-in hitbox rewinding	Built-in		Requires self development	
Lag Compensation	Not built-in. Requires self development (?)	Not built-in. Requires self development (?)	Built-in		Built-in	Requires self development	
Client side prediction	Not built-in. Requires self development (?)	Not built-in. Requires self development (?)	Built-in			Requires self development	
Authoritative Movement	Supported	Supported	Built-in	Supported	Supported	Supported	
Interpolation/Extrapolation	Built-in and customizable	Built-in and customizable	Built-in, not customizable (?)	Built-in and customizable	Supported	Requires self development	
Reconnection system for unstable clients						Built-in	
Dedicated MMO features						Built-in	

ilt-in (no additional or minimal supported (little required):	dev time Provided as an additional service fr developers. Or support/built-in but	rom the same Requires a third party service compatible one is easily found.	A Not built-in. Is supported but requires a lot of development time or a third party solution.	Not supported at all. Third party libraries and custom solutions do not work with the framework.	Uncertain. Requires further research.		
General	Dark Rift 2	LiteNetLib					
Networking Model	Client/Server Message events, Plugins. Client and						
Unity Integration	Server components						
Highest possible authority	Dedicated server Minimal with dedicated server setup						
Ease of client hacking	Not built-in. Requires self						
Host Migration Versioning (players of different	development						
versions separated) Network callbacks	Supported						
Network calibacks Source Code	Supported Available in paid version						
Built-in Physics Features/Support Cross-Platform	? Desktop, Mobile, Console, Web (custom listener required)						
Hosting Features/Platform							
Hosting Hosting	Dark Rift 2 Dedicated Servers, Listen Server,						
	Local LAN / Wifi Bi-channel UDP/TCP, Customizable						
Transport layer protocols	(steam, custom, websockets) Built-in						
Dedicated Game Servers Listen Servers	Built-in						
	Requires 3rd party services						
Relay Servers	(steamworks) Not built-in. Requires self						
Peer to Peer (P2P) NAT punchthrough	development Requires 3rd party services (steam						
	api)						
LAN support	Built-in						
Offline mode (single player)	Durith In						
Headless Server	Built-in						
Direct IP Connection	Built-in Not built-in. Requires self						
Multicast (lan discovery)	development						
Server Plugins	Built-in						
Matchmaking	Dark Rift 2 Provided as a separate service					-	
Matchmaking	(requires Pro version) Not built-in. Requires self						
Room list Player Lobbies (ability to	development Not built-in. Requires self						
communicate)	development Provided as a separate service						
by filters) ustom Room options (player count,	(requires Pro version) Provided as a separate service						
	(requires Pro version)						
Custom Matchmaking properties and filters	Provided as a separate service (requires Pro version) Not built-in. Requires self						
ot Reservation (allows only certain players to join)	development						
In-Game	Dark Rift 2						
Synchronize variables	Messages/Events, IDarkRiftSerializable						
Animation synchronization	Supported						
Custom Networked Events	Built-in						
Commands & RPCs	MessageReceived/Send Message						
Message target selection (events, RPCs)	Built-in (fully custom)						
ustom Properties (arbitrary values available to everyone)	Supported						
Networked/Synchronized Timestamp	Supported						
Interest Groups/Visibility	Not built-in. Requires self development (in roadmap)						
Custom Type Serialization (non RPC)	Built-in						
Networked Object Pooling	Supported						
Send Rate Customization	Supported						
Synchronized map loading	Supported						
Entity Ownership/Control Transfer	Supported						
Additive Scene Loading	Supported						
Physics Scenes	Supported						
Ban Clients	Built-in (strike system)						
Spawn Management (Network Objects)	Not built-in. Requires self development						
RPC Return values	Not built-in. Requires self development						
	development						
	1						
Gamenlav Specific	Dark Rift 2		i company and the company of the com	+	-		
Gameplay Specific	Dark Rift 2 Not built-in. Requires self						
Rewinding	Not built-in. Requires self development Not built-in. Requires self						
Rewinding Lag Compensation	Not built-in. Requires self development Not built-in. Requires self development Not built-in. Requires self						
Rewinding Lag Compensation Client side prediction	Not built-in. Requires self development Not built-in. Requires self development Not built-in. Requires self development						
Rewinding Lag Compensation	Not built-in. Requires self development Not built-in. Requires self development Not built-in. Requires self						

	i e e e e e e e e e e e e e e e e e e e	real and the second	r i i i i i i i i i i i i i i i i i i i	r i i i i i i i i i i i i i i i i i i i	1 1