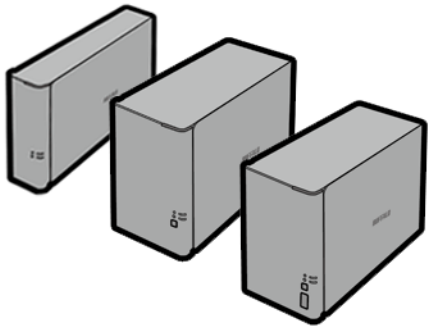
LinkStation User Manual

LinkStation™ 400

LS410D LS420D LS421DE



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Chapter 1 Installation

Installation

1 Follow the steps on the Quick Setup Guide to connect the LinkStation's Ethernet and power cable (and install the hard drive for LS421DE), and turn it on.

2 Insert the LinkNavigator CD into your computer.
LinkNavigator will launch.

3 Click *Begin Installation*.

Notes:

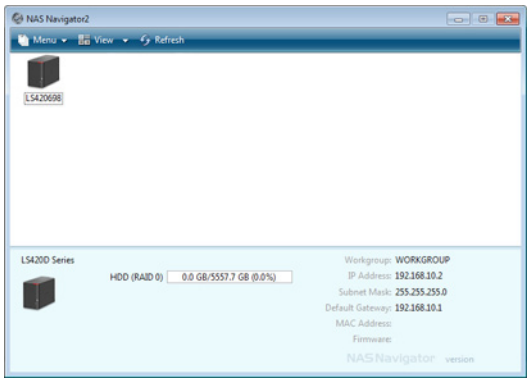
- If the CD doesn't seem to launch automatically, double-click (LSNavi.exe) icon.
- An autoplay screen may appear with Windows 8, Windows 7, or Windows Vista. Click *Run LSNavi.exe* then. If "A program needs your permission to continue." is displayed, then click *OK* or *Continue*.
- If your computer does not have a CD or DVD drive, you may download the LinkNavigator software from www.buffalotech.com.
- For Mac OS, double-click the LinkNavigator icon in the utility CD.
- Temporarily disable your anti-virus software and software firewall. Re-enable the software after setup is complete.

4 Follow the steps on the screen to install NAS Navigator2.

5 Click *Finish*.

NAS Navigator will open. You can also open it by clicking icon.
Click *Software* to install additional software.

6 In NAS Navigator2, double-click your LinkStation's icon. This will open the shared folder of the LinkStation. For Mac OS, the LinkStation is mounted as a drive icon on the desktop or is displayed in the sidebar of the Finder.



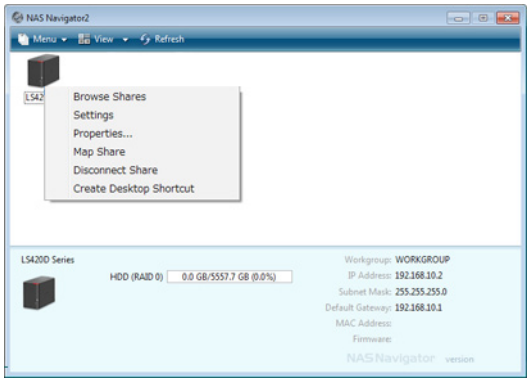
Initial Setup (Changing Admin Password and Adding a Shared Folder)

After initial setup, changing your password and creating other shared folders are recommended.

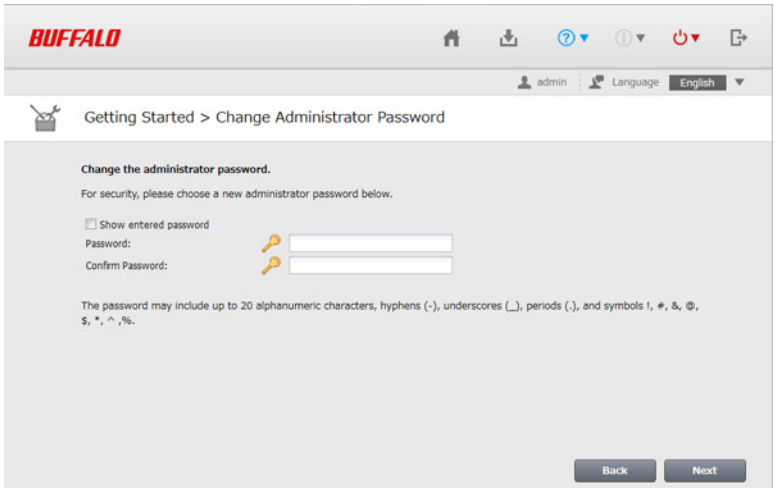
1 Double-click the icon.
NAS Navigator2 will start.

Note: For Mac OS, click the icon in the Dock.

2 Right-click on your LinkStation's icon and select *Settings*. On the Mac, select the LinkStation's icon while holding down the control key, then select *Settings*.



3 Changing the password from the default is recommended.



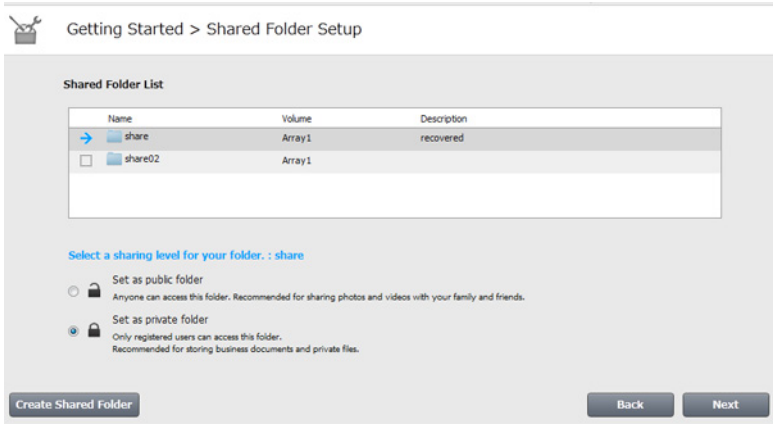
Notes:

- To use Settings, Internet Explorer 9 or later, Firefox 18 or later, Google Chrome 24 or later, or Safari 5 or later is recommended. Other browsers may not show Settings correctly.
- You can show the same screen by clicking *Getting Started* at the top page.

4 Enter the new password (twice), then click *Next*.

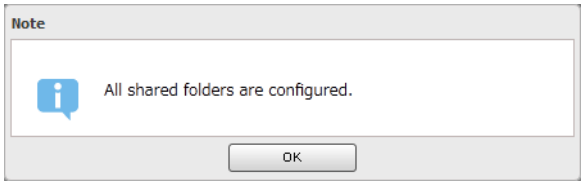
Note: The default username and password are "admin" and "password". To keep the defaults, leave both fields blank and click *Next*.

5 Configure levels of sharing for all existing shared folders (public or private) to complete the initial setup wizard.



Note: Select "Set as private folder" to configure access attributions for each users, read only or read and write. Click *Create User* to create new username and password.

6 Click *OK* when the following message is displayed.



Turning the LinkStation On and Off

Move the power switch on the back of the LinkStation to the "on" position to turn it on. To turn it off, move the switch to the "off" position and wait for the unit to fully shut down before unplugging it. Never unplug the AC adapter without properly powering down the LinkStation first.

When all the LEDs on the front of the LinkStation turn off, the shutdown process is complete.

Chapter 2 Configuration

Configure and administer your LinkStation using the settings interface, accessible from a browser window. Open the interface using the procedure below or type the LinkStation's IP address in the URL field of your browser. Within Settings, the Easy Admin page gives you quick access to commonly used settings.

Note: Internet Explorer 9, Firefox 18, Google Chrome 24, Safari 5, and later are supported. If you have difficulty viewing Settings, check the following:

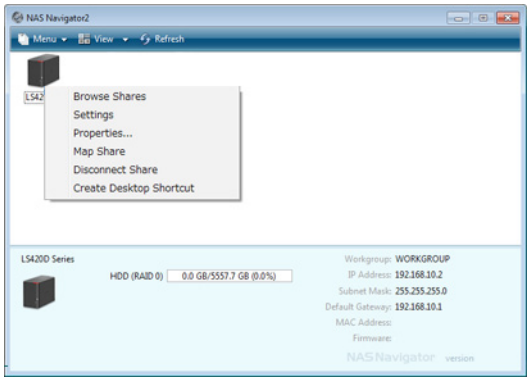
- If there are a large number of registered users, groups, or shared folders, use Firefox 18 or later instead of Internet Explorer.
- If you have a proxy server enabled in the browser settings, disable the proxy server.
- With Internet Explorer, set security to *Local intranet*. On Windows Server 2012 or Windows Server 2008, higher-level security is configured. Set the security to a lower level temporarily.

Opening Easy Admin

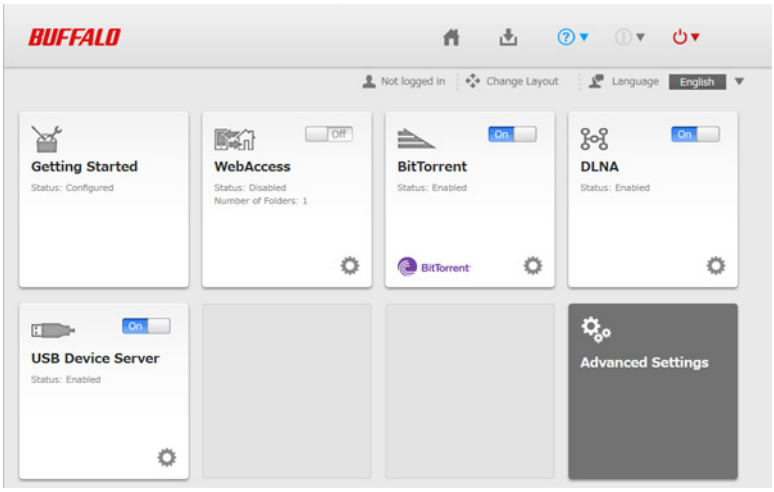
Use the Easy Admin page to make common changes to basic settings.

1 Open NAS Navigator2 by double-clicking the icon.

2 Right-click on your LinkStation's icon and choose *Settings*. For Mac OS, click the LinkStation icon while holding down the control key, then select *Settings*.

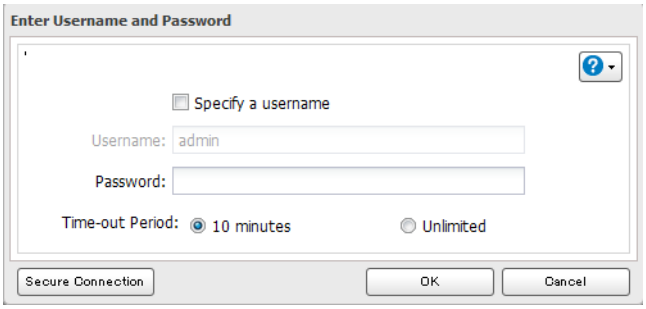


3 The Easy Admin screen will open.



Notes:

- If you click any buttons, you will need to enter a username and password.



- Username/Password Combinations:

Username	Password	Settings Available
admin	password	All
guest	blank	LinkStation's name, IP address, workgroup, drive status, firmware version
your username	your password	LinkStation's name, IP address, workgroup, drive status, firmware version, and your password.

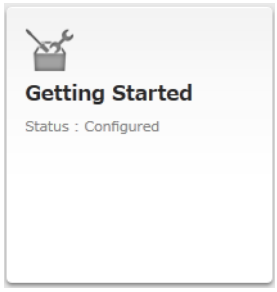
- If the time-out period is set to "10 minutes", you will be logged out of Settings after 10 minutes of inactivity. You will also be logged out when you reboot the LinkStation or close the web browser, even if you select "Unlimited".
- Click *Secure Connection* to secure your login.
- You can also use Bonjour to log in to Settings on Mac OS.
  In Safari, click *View - Show Bookmarks Bar*. From Bookmarks, click *Bonjour - LinkStation name*.

Getting Started

The wizard lets you configure the following settings:

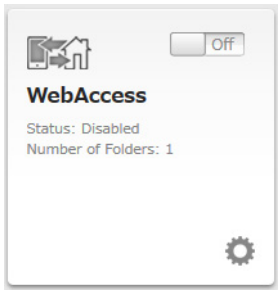
- Changing administrator password

- Creating shared folders
- Access restrictions for shared folders with each users



Refer to "Installation" for more details.

WebAccess

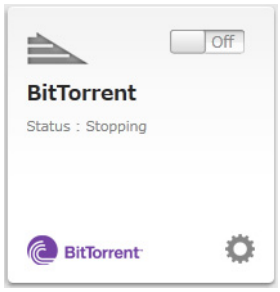


Configure WebAccess settings to remotely access your LinkStation.

Refer to "WebAccess" for more details.

BitTorrent

Configure BitTorrent downloads.



Refer to "BitTorrent" for more details.

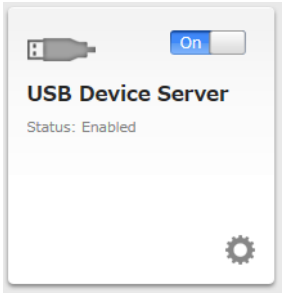
DLNA

Configure your LinkStation to use it with DLNA-compatible devices on the LAN.

Refer to "DLNA" for more details.

USB Device Server

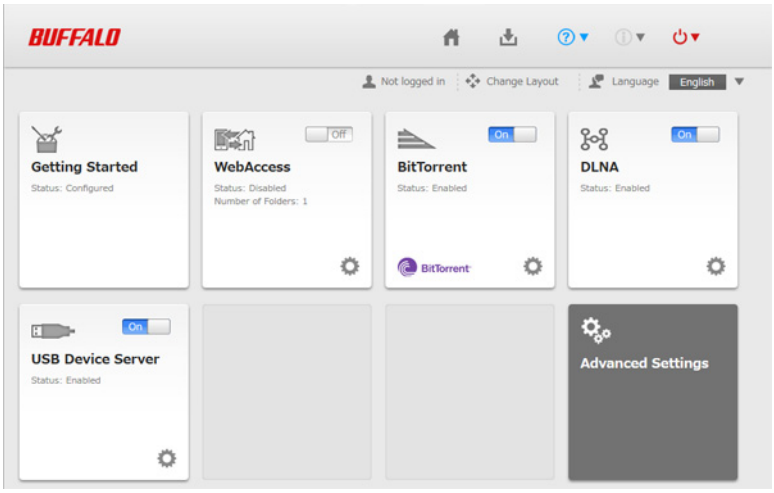
Configure USB Device Server options.



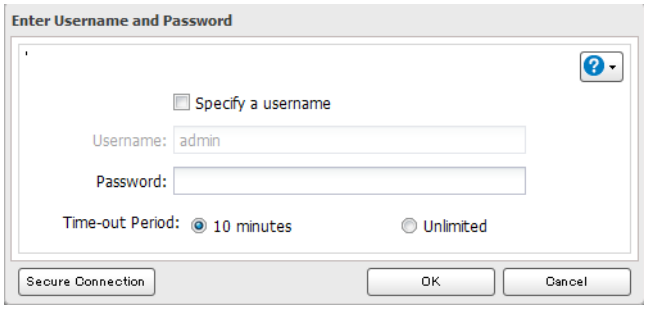
Refer to "USB Device Server" for more details.

Opening Advanced Settings

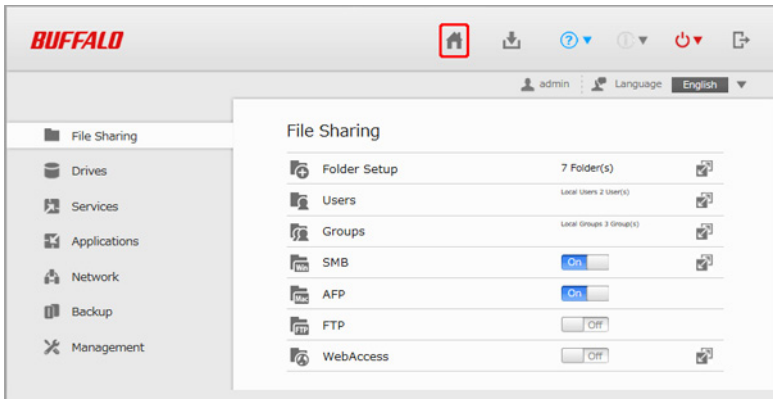
1 Click *Advanced Settings* in Easy Admin.



2 Enter the administrator username and password, then click *OK*.



3 The Advanced Settings screen will open.



Note: To go back to Easy Admin, click the Home icon.

Chapter 3 Remote Access

WebAccess

WebAccess is a software program for accessing the files in the shared folder of your LinkStation from your computer, smartphone, or tablet through the Internet.

Notes:

- Be careful when configuring WebAccess. Certain settings can make the files in the shared folder available to anyone on the Internet, without any access restrictions.
- Use compatibility mode to use WebAccess with Windows 8 in desktop mode.

Use with iPhone, iPad, iPod touch

Download the "WebAccess" application from App Store.

Instructions: http://buffalonas.com/manual/i/en/

Use with Android

Download the "WebAccess" application from Google Play.

Instructions: http://buffalonas.com/manual/a/en/

Use with Windows Phone

Configure your LinkStation from the computer first, then download the "WebAccess" application from Windows Phone Store.

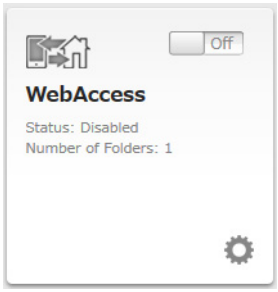
Instructions: http://buffalonas.com/manual/setup/en/

Use with the browsers on your computer

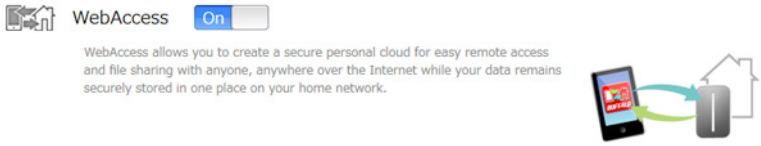
Follow the procedure below to configure WebAccess.

Configuration from Easy Admin

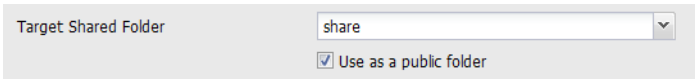
1 Click *WebAccess* in Easy Admin.



2 Move the WebAccess switch to the On position to enable WebAccess.



3 Choose a shared folder that will be public on the Internet from "Target Shared Folder". Make sure that "Use as a public folder" is checked.



If "Use as a public folder" is unchecked, the share will not be accessible via the Internet.

4 Enter a BuffaloNAS.com name for your BuffaloNAS account.

Note: The BuffaloNAS.com name may contain between 3 to 20 alphanumeric characters, underscores (_), and hyphens (-). The BuffaloNAS.com name is case-sensitive.

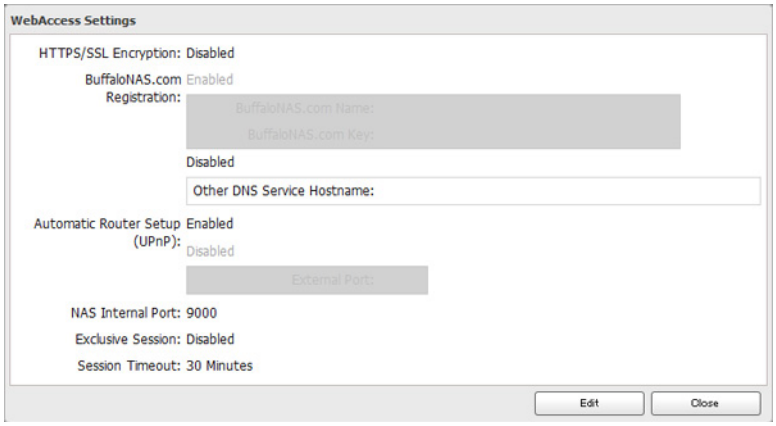
5 Click *Apply*.

6 Continue with the procedure at http://buffalonas.com/manual/setup/en/.

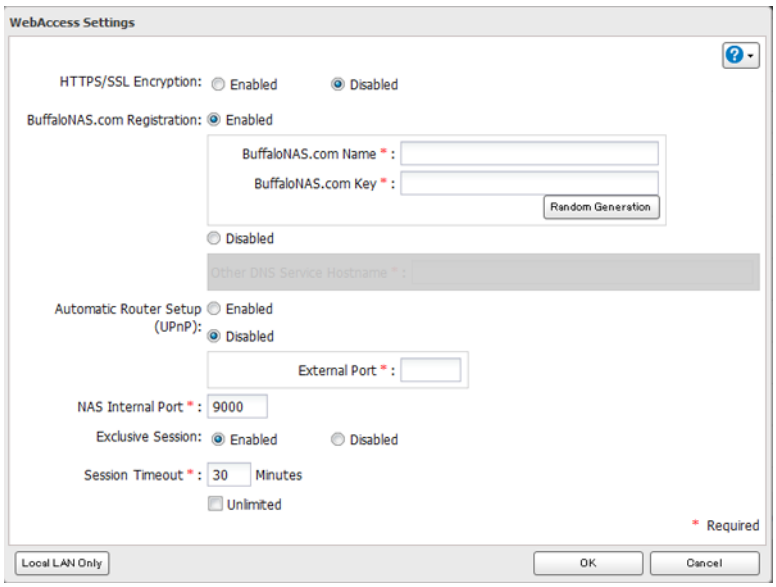
Configuration from Advanced Settings

1 Navigate to *File Sharing* - *WebAccess*. Click to the right of "WebAccess".

2 Click *Edit*.



3 Configure the desired settings, then click *OK*.



- To use SSL encryption for more secure data transfers, enable "HTTPS/SSL Encryption".
- Some WebAccess applications may not support HTTPS/SSL encryption. Disable it in such a case. For more details, refer to the WebAccess Help Guide.
- You may use the default BuffaloNAS.com registration, or disable to use a different DNS server.
- Choose a "BuffaloNAS.com name" for your WebAccess account. Names may use 3 to 20 alphanumeric characters, underscores (_), and hyphens (-).
- If "Exclusive Session" is enabled, users cannot log multiple computers into WebAccess. Only the last login will be active.
- Enter a time in minutes (1 to 120 or "Unlimited") before inactive users are logged out of WebAccess.

4 Click *OK*.

5 Move the switch to the On position to enable WebAcces.

6 Click to the right of "Folder Setup".

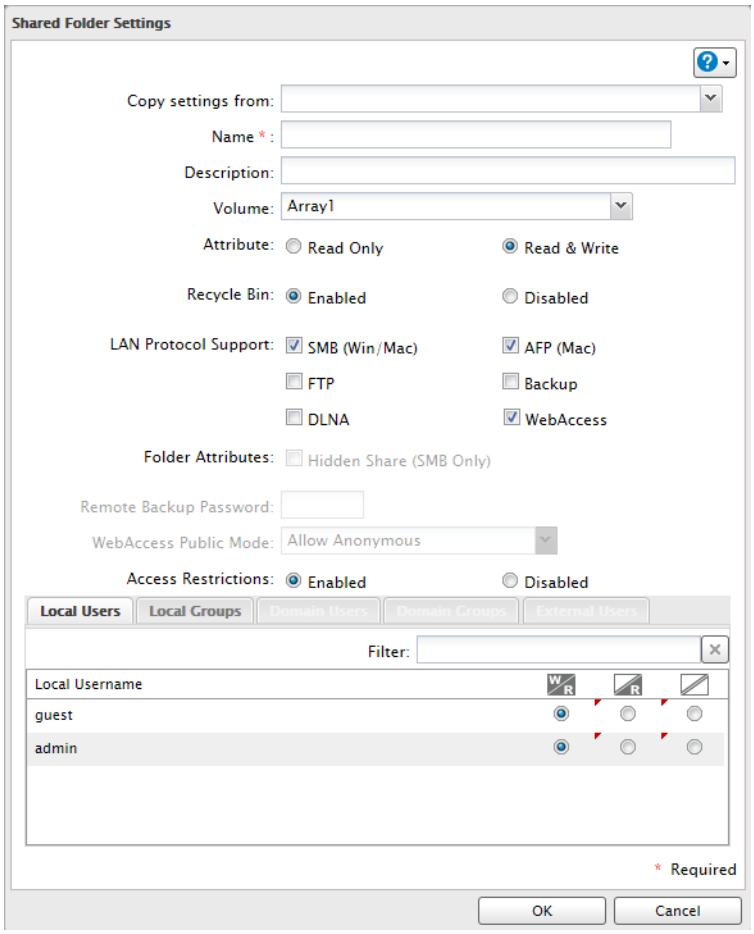
7 Select a shared folder to publish.

Notes:

- For best results, create a new dedicated share for WebAccess.
- Whether accessing shared folders through WebAccess from a remote location, the username and password may be required for certain operations. For best results, configure a user account with permissions on the WebAccess share before using WebAccess.

8 Click *Edit*.

9 Navigate to *File Sharing - Folder Setup* and choose the folder you will use for WebAccess. Enable "WebAccess LAN Protocol Support".



Notes:

- The following levels of security are available:
  Allow Anonymous - Anyone can access (view) shared folders.
  Allow All Groups and Users- All groups and users registered on the LinkStation or TeraStation can use WebAccess.
  Use Inherited Folder Permissions - Users and groups have the same access permissions with WebAccess that they do locally. If access restrictions are not set for the shared folder, then this option will not be shown.
- When a user or group can access a folder through WebAccess depends on a combination of WebAccess settings and the shared folder's settings.

Folder Setup	WebAccess Public Mode	Allow Anonymous		Allow All Groups and Users		Use Inherited Folder Permissions	
	Folder Attribute	Read & Write	Read Only	Read & Write	Read Only	Read & Write	Read Only
WebAccess Account	Not Logged in	R	R	-	-	-	-
	Users with Read & Write Access	R/W	R	R/W	R	R/W	R
	Users with Read-Only Access	R/W	R	R/W	R	R	R
	Users Who Belongs to a Group with Read & Write Access	R/W	R	R/W	R	R/W	R
	Users Who Belongs to a Groups with Read-Only Access	R/W	R	R/W	R	R	R
	Users not Included in Any of the Categories Above	R/W	R	R/W	R	-	-

R: Read only, R/W: Read and write, -: Cannot access

10 Continue with the procedure at http://buffalonas.com/manual/setup/en/.

Note: If you change your BuffaloNAS.com name after WebAccess has been configured, WebAccess may no longer work properly. If this happens, disable and then re-enable WebAccess.

FTP

By default, the LinkStation's shares are only accessible by users connected to the same network or routers as the LinkStation. The optional FTP server allows users outside the local network to access the LinkStation.

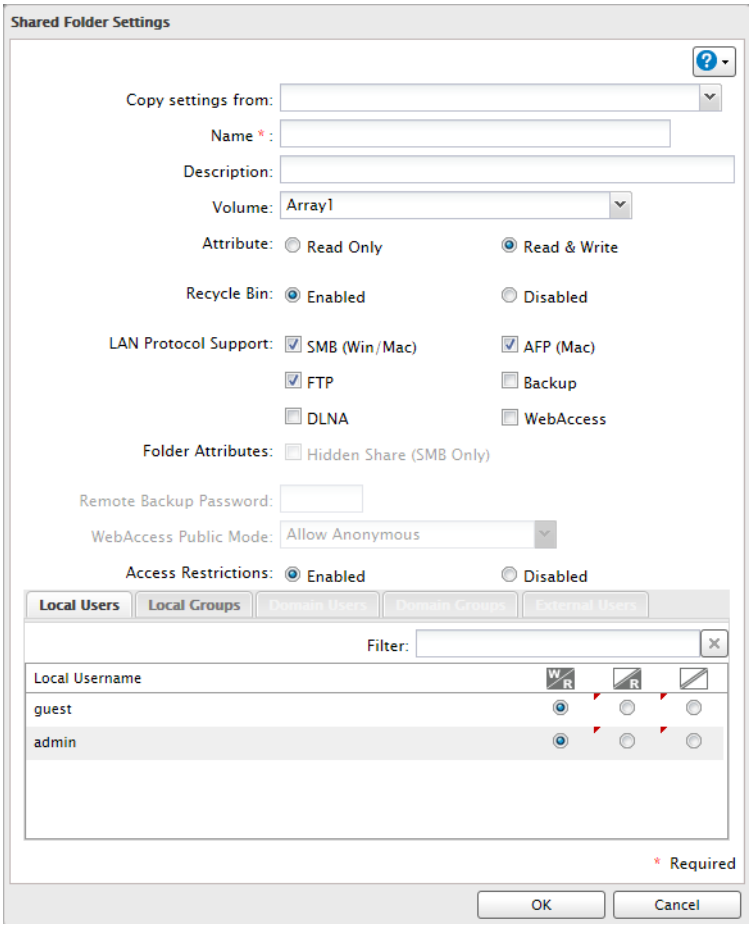
Note: FTP is intended for users who already have FTP client software and have experience with it.

1 In Advanced Settings, navigate to *File Sharing - Folder Setup*. Move the FTP switch to the On position to enable FTP.

2 Click to the right of "Folder Setup".

3 Choose a folder to enable remote FTP access on.

4 Select read-only or read & write for the shared folder's attribute, check "FTP" under "LAN Protocol Support", then click *OK*.



Accessing the LinkStation with an FTP client

- To access the LinkStation via FTP, configure your FTP client software with the following settings:
  Hostname: IP address of the LinkStation
  Username: The LinkStation's username
  Password: The LinkStation's password
  Port: 21
- Shared folders connected by FTP are available from the "/mnt" directory. The default locations are:
  For RAID 0 or RAID 1:
  /mnt/array1/share
  /mnt/usbdisk1
  /mnt/usbdisk2
  For JBOD:
  /mnt/disk1/share
  /mnt/disk2/share2
  /mnt/disk3/share3
  /mnt/disk4/share4
  /mnt/usbdisk1
  /mnt/usbdisk2

Accessing the LinkStation with Anonymous User:

- To allow anonymous access to your FTP share, disable access restrictions.
- To access the LinkStation via anonymous FTP, configure your FTP client software with the following settings:
  Hostname: IP address of the LinkStation
  Username: Anonymous
  Password: Any character string

Port: 21

Notes:

- Keep your LinkStation's firmware up-to-date.
- Don't use FTP to share files and folders with multi-byte characters in their names with a Mac. Use an AFP or SMB connection instead.
- If a file was created or copied by AFP, you may not be able to delete it using an FTP connection. If this occurs, use an SMB or AFP connection instead to delete the file.
- For FTP connections, make sure that the total filename including directory path is 250 single-byte characters or less.

Chapter 4 Access Restrictions

You may restrict access to specific shared folders.

Notes:

- Access restrictions can be set separately for each shared folder, but not for folders within the shared folders.
- Configure access restrictions through Settings. Configuring access restrictions through Windows is not supported and may cause unexpected behavior.
- Depending on your settings, access restrictions may not affect users who are accessing via WebAccess, Backup, or DLNA.

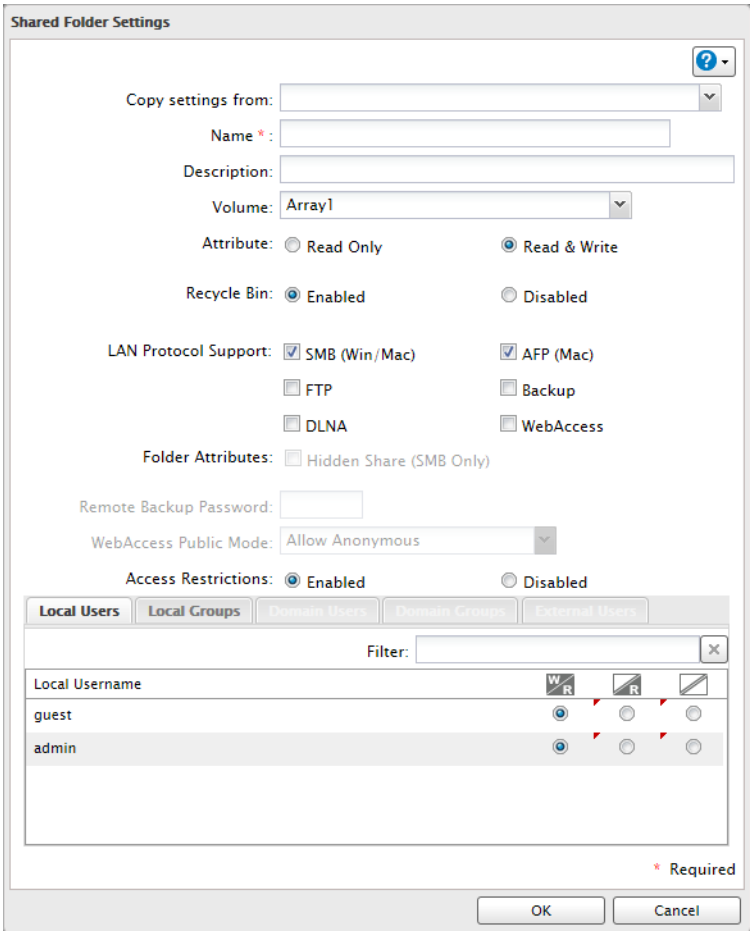
Configuring Access Restrictions on Users and Groups

Adding a Shared Folder

1 In Advanced Settings, navigate to *File Sharing - Folder Setup* and click the icon.

2 Click *Create Folder*.

3 Configure the settings, then click *OK*.



Notes:

- Names may contain up to 27 alphanumeric characters, hyphens (-), and underscores (_). Do not use a symbol as the first character in a name.
- The description may contain up to 75 alphanumeric characters, hyphens (-), underscores (_), and spaces. Do not use a symbol or space as the first character.
- You may create up to 400 shared folders.
- The names of shared folders should not use characters from more than one language. For example, mixing Japanese and Korean characters in names is not supported.
- If multi-byte characters are used in shared folder names, configure the client language to match the characters in *Management - Name/Time/Language*.

Recycle Bin

To protect your data from accidental deletion, you can enable a recycle bin instead of deleting files immediately. The recycle bin will only work with SMB connections.

Accounts

Your LinkStation's username and password should be the same as your Windows username and password. If they are different, you may not be able to access folders on the LinkStation with access restrictions configured.

Read-only Shares

By default, new shares are set with read & write access, but you may change the attribute to "Read-only" in "Shared Folder Attributes". Read-only shares and HFS+ formatted USB hard drives will have "Read-only" added to the shared folder description.

Hidden Shares

To hide a shared SMB folder, select "Hidden Share (SMB Only)" and click *OK*. Folders with AFP or FTP support enabled can't be hidden. To open a hidden folder, click *Start - Search programs and files* and enter "\\LinkStation's name\Shared folder names$\" for the name. Example: If the LinkStation's name and shared folder name is "LSXXX001" and "share", you should enter "\\LSXXX001\share$\" in the search box.

Notes

- The following characters are handled differently by Mac OS and Windows. Avoid using these characters when sharing data between Mac OS and Windows:

  ～ ∥ − ¢ £ ¬

- Windows does not support some characters that Mac OS and the LinkStation allow. If you create a filename on a Mac with any of the following characters, it will not display correctly on a Windows computer and you may have to connect to the LinkStation via AFP in order to display or copy any of the following characters on a Mac computer.

  ? [ ] / \ = + < > ; : " , | *

- Do not use any of the following words as a username or group name: root, bin, daemon, sys, adm, tty, disk, lp, sync, shutdown, halt, operator, nobody, mail, news, uucp, ftp, kmem, utmp, shadow, users, nogroup, all, none, hdusers, admin, guest, man, www, sshd, administrator, ftpuser, apache, mysql
- Do not use any of the following words as the name of a shared folder. These words are reserved for internal use by the LinkStation: info, spool, lost+found, global, printers, homes, lp, authtest, ram, msdfs_root, mt-daapd, usbdisk# (where # is a number, for example: usbdisk1)
- Don't use the following unsupported characters in shared folder names, workgroup names, or filenames:

①②③④⑤⑥⑦⑧⑨⑩⑪⑫⑬⑭⑮⑯⑰⑱⑲⑳ Ⅰ Ⅱ Ⅲ Ⅳ Ⅴ Ⅵ Ⅶ Ⅷ Ⅸ Ⅹ
ⅰ ⅱ ⅲ ⅳ ⅴ ⅵ ⅶ ⅷ ⅸ ⅹ ㍉㎜㎝㎞㎎㎏㏄㎡№K.K.TEL㊤㊥㊦㊧㊨㈱㈲㍾㍽㍼
ミリ キロ センメーグラト アールクリッワカロド センバーミリベー ｜ ' " ″ 〃 § Σ ∟ ⊿
纊襲錆銛配倚妬昱棈鋹舜璢丨仡任伀伋但倗俊俔俣俤俥倩倰傑傭傸僩儆兗勷卮冦凩刧劾勛匀匆匡匧厲叛夔妛它昧咩哿喆坙埴堺埜堽塚
増墫奕婆娚嫺奸妹孖宗寙寘寬寮尭岑峇峞崙崎崔嵑嵯嵺嶌嶽巽帋彈彧德忞恝
悅悋惞愡愠惲愐愚愷愾戛或抭擠撠揶擎敓昀昕昂昉昃昞昤晙晴晢晷暐暾曇暲
曎曺朐朗杕杷柔被柳栁楫椏椙楨榰榘槧樒榴槔樠横橾櫻櫾欅欟毆氿汜沆汯泐洄涇浯
涬涪渓清涼淰淙渕湿滹濆濞濠濵瀛瀧瀬炅炫烟烝煌煆煇熙燁燾犹狄猴猪獷
珣珉珖珣珪琇琅琦琪琩琮瑢璉璟甁畯皂皜皞皛皦益睨砌砑硎硤硺碡礼神祥
禔福禎竑竰竱竫箸精絅耟絛絣絳綧綯罇羨羽茁荸荻莅蓁蓜蔓蕙董蕘蕠薬虻
蝪蠏訒詖詹誧閶諟諸諶諠譱賭賴贇赶赸軏迭逸遣郎都鄉鄧釚釗釵釭釮鈔鈒
鈆鈐鈖鈇鈑鈤鈸鉀鉎鉏鉑鈹鉐鉞鉉鋏鋧鋗鋙鋐鋓鋪鋭鋺鍖鍛鍔鍚鍬鍮鍰鍇
鏆鏐鏘鏈鏹鏤鐓閧閹隆隝隣霞霾霻霽鬮靑靖顊顥飯飼餧館餬騏髙鬩鮒鮓鮭
鯑鯵鰄鵙鵺鶴鸙黑畝秈緇臂蘊訃躰鐓饐鷯

- File and folder names may contain up to 255 single-byte characters.
- Configure hidden and read-only file attributes in Settings. Configuring them from within Windows is not supported and may cause unexpected behavior.
- Folder and workgroup names whose names contain non-Roman characters may not be displayed correctly.
- If shared folders are accessed from a Macintosh, information files for the Macintosh may be generated automatically. Do not delete these files. If they are deleted using Windows, this may prevent further access from a Macintosh.
- If an SMB connection is used with OS X 10.3.9, the names of mounted volumes may appear as unreadable characters

in Finder and other applications. This is not a problem with the filename or data.

- The LinkStation belongs to the default zone in AppleShareServer; the zone cannot be specified.
- When files are copied to the LinkStation or to a USB drive connected to the LinkStation, file information such as date created, date modified, and other date information may be updated or changed.
- Hard drive capacity is shown in Settings in actual gigabytes. The Properties window of Windows may show GiB instead, which will be a smaller number.
- During a file transfer, if settings are changed, the file transfer operation may be aborted.
- File copying to the LinkStation is protected by a journaling file system.

  - The preset data (LinkStation name, user, and group) may be erased.

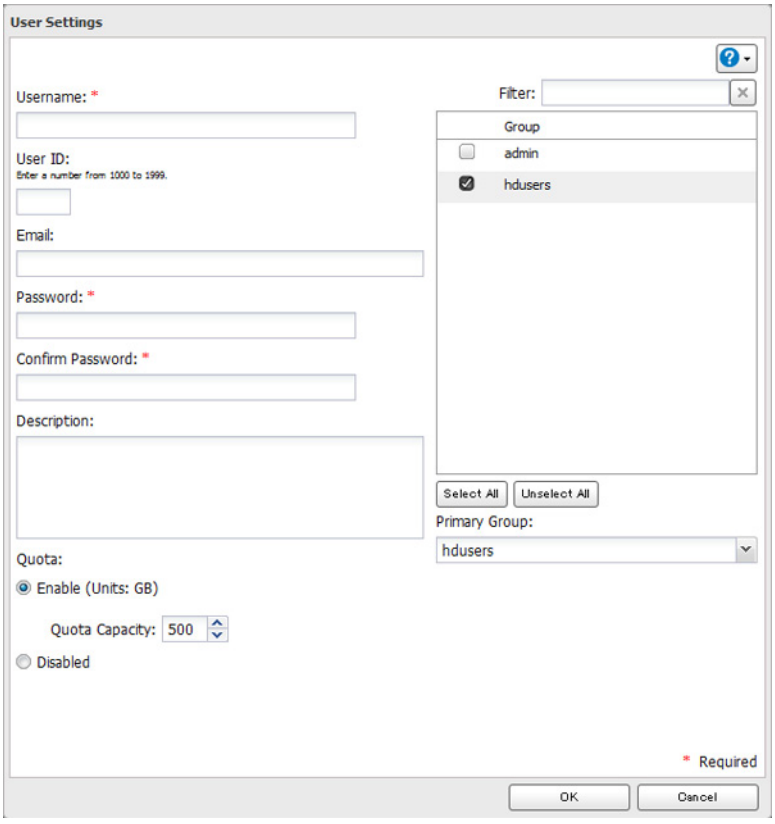
  - An incomplete file may be copied and the file can no longer be deleted. If this happens, restart the LinkStation, delete the file, and perform the copy operation again.
- After a drive is formatted, the "% Used" and "Amount Used" in Settings will not be 0. This is because some drive space is used for the system area.

Adding Users

1 In "File Sharing", click the icon to the right of "Users".

2 Click *Create User*.

3 Enter the desired settings, then click *OK*.



Notes:

- Username may contain up to 20 characters, including hyphens (-), underscores (_), periods (.), !, #, &, @, $, *, ^, and %. Do not use a symbol as the first character.
- For Windows 8, use a local username instead of your Windows Live ID.
- The user ID should be a number from 1000 to 1999. Each user ID should be unique. If this field is left blank, a user ID is assigned automatically.
- When you log in to Settings as a registered user, you can see the LinkStation's name, IP address, workgroup, and disk status, and modify the password.
- Do not duplicate user IDs, group IDs, usernames, or group names. Each should be distinct and unique.
- The description may contain up to 75 alphanumeric characters, hyphens (-), underscores (_), and spaces. Do not use a symbol or space as the first character.
- When setting users with access privileges, a maximum of 300 users, including "admin" and "guest", can be registered in the LinkStation.
- The password may contain up to 20 alphanumeric characters and the following characters: - _ @ ! # $ % & ' ( ) * + , . / ; < > = ? " [ ] ^ { } | ~. Do not use a symbol other than an underscore (_) as the first character.
- Use the same username and password for both Windows and the LinkStation or you may not be able to access shared folders.
- If a user belongs to multiple groups, the most strict access restrictions will apply. For example, if a user is added to a group with read and write access, and also to a read-only group, the user will effectively have read-only access.

Shared Folder Owners

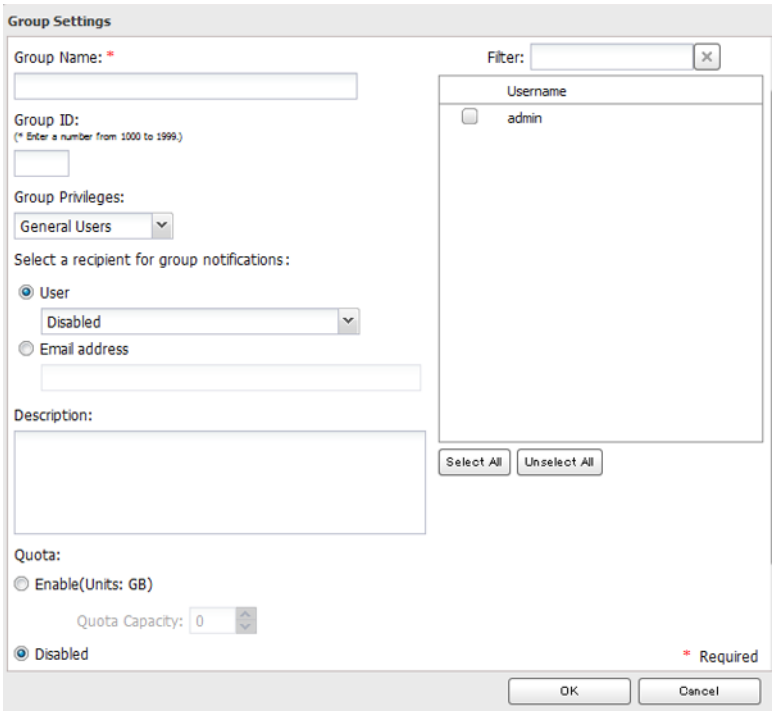
To confirm the owner of a shared folder from Windows XP, from the *Properties* screen of the file or folder, open a new windows from the *Security* tab. Click *Advanced*, then click the *Owner* tab.

Adding Groups

1 In "File Sharing", click the icon to the right of "Groups".

2 Click *Add Group*.

3 Enter settings, then click *OK*.



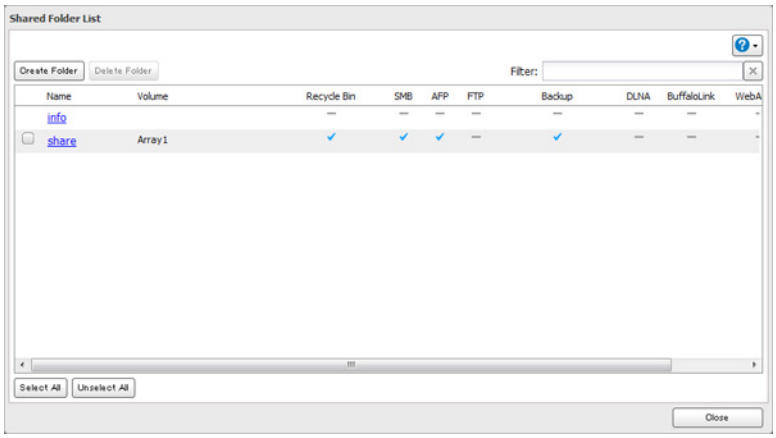
Notes:

- Group names may contain up to 20 alphanumeric characters, hyphens (-), underscores (_), and periods (.). Do not use a symbol other than an under score (_) as the first character.
- Group descriptions may contain up to 75 alphanumeric characters, hyphens (-), underscores (_), and spaces. Do not use a symbol or space as the first character.
- If the group ID field is left blank, a group ID is automatically assigned. Use numbers between 1000 and 1999 to set a group ID manually. Don't use duplicate group IDs.
- You may register up to 300 groups with the LinkStation.
- If you are logged in as a member of the "General Users" group, you can only change your own password. If you're logged in as an "Administrator", you can change any settings, including other user's passwords.
  If you are logged in as a member of the power users group, you can create and edit shared folders, users, and groups.

Access Restrictions

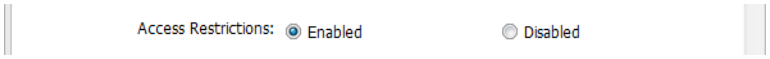
1 In "File Sharing", click the icon to the right of "Folder Setup".

2 Click the shared folder that you want to set access restrictions for.



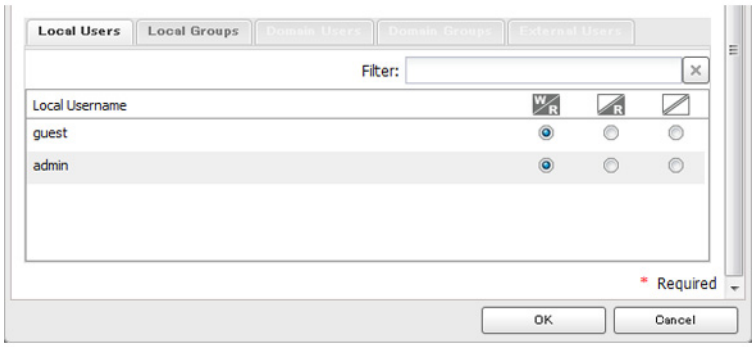
3 Click *Edit*.

4 Enable "Access Restrictions".

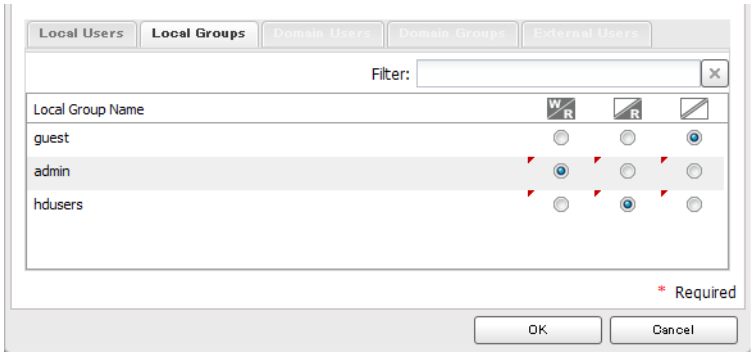


5 Select the level of access for the user or group you added.

: Read and write access allowed : Read access allowed : Access prohibited



Note: An example of access restrictions by local users is shown in the screen. To apply access restrictions by group, click the *Local Groups* tab and select group permissions.



6 Click *OK*.

Notes:

- If you log in from a Microsoft network domain, you can set access restrictions with users and groups from the domain.
- If both "Read only" and "Read & Write" permissions are given to a user, the user will have read-only access. The

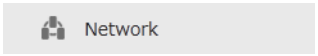
most restrictive access restrictions always apply.

Active Directory

The LinkStation can join an Active Directory domain. Up to 1000 domain users and 1000 groups may be downloaded from Active Directory.

Note: If usernames or group names from Active Directory include multi-byte characters, you will not be able to configure access restrictions for them.

1 In Settings, select *Network*.



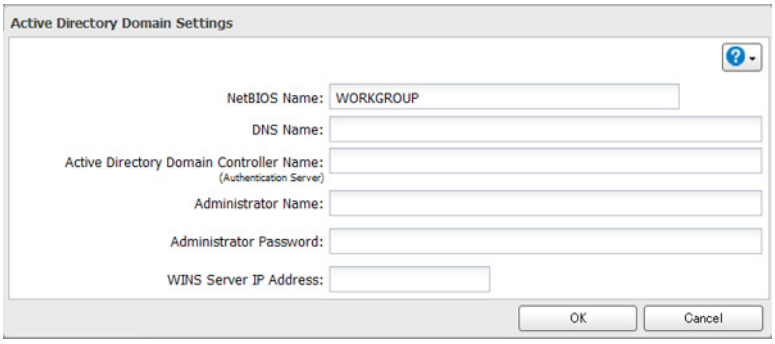
2 Click to the right of "Workgroup/Domain".

3 Click *Edit*.

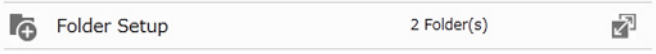
4 Select "Active Directory", then click *Next*.

5 Click *Yes*.

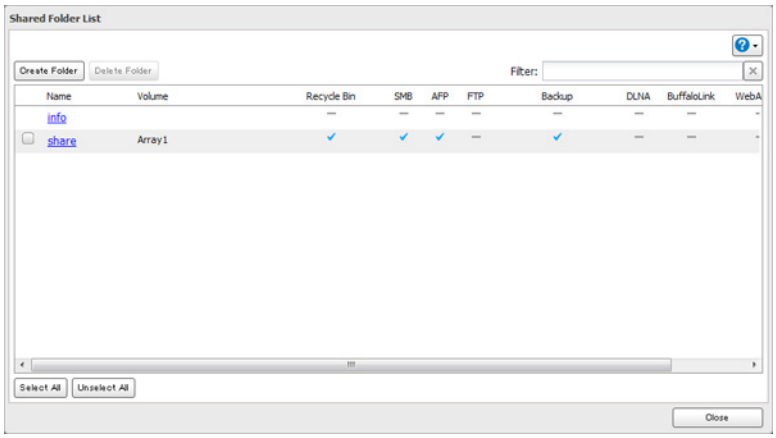
6 Enter the desired settings, then click *OK*.



7 Choose *Folder Setup*.

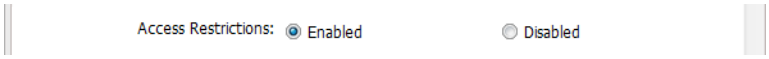


8 Click a shared folder that you want to set access restrictions for.



9 Click *Edit*.

10 Enable "Access Restrictions".



11 Select the level of access for the user or group:

: Read and write access allowed : Read access allowed : Access prohibited

12 Click *OK*.

Notes:

- If both read-only and read & write permissions are given to a user, the user will have read-only access. The most restrictive attribute will apply.
- To have the LinkStation join an Active Directory domain, configure it to use a DNS server that can resolve names for the Active Directory domain.
- After building an Active Directory domain, the administrator password for joining the domain must be changed at least once, or joining the Active Directory domain will fail.
- The DNS name and NetBIOS name of Active Directory domain should be identical.
- If there are more than 5 minutes difference between the LinkStation's clock and the domain controller's clock, joining the domain or authenticating domain users and groups may fail. For best results, use an NTP server to set the time for all network devices.

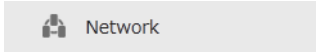
NT Domains

In an NT domain environment, the LinkStation uses account information from the NT domain server to set access restrictions for files and folders on the LinkStation. There's no need to perform individual account management for the LinkStation. If multiple LinkStations are installed on the network, the account information is centrally managed in the NT domain, greatly reducing the operations required for installation and management.

Note: A maximum of 1000 domain users and 1000 groups can be downloaded from an NT domain server.

1 Create an account on the domain controller for the LinkStation.

2 In Settings, click *Network*.



3 Select *Workgroup/Domain*.

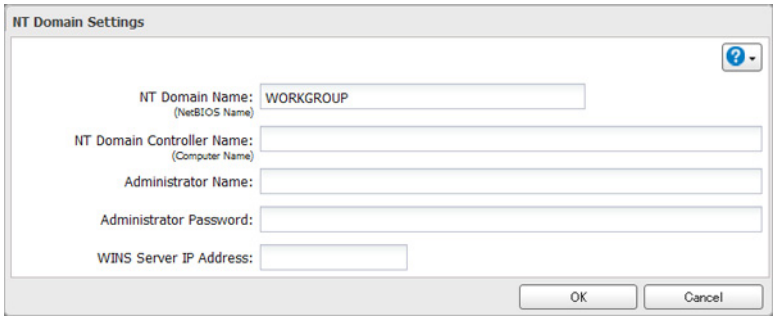
4 Click *Edit*.

5 Select "NT Domain", then click *Next*.

Note: To use Active Directory from Windows 2000 or Windows Server 2003, select *Active Directory* instead of *NT Domain*.

6 Click *Yes*.

7 Enter settings and click *OK*.

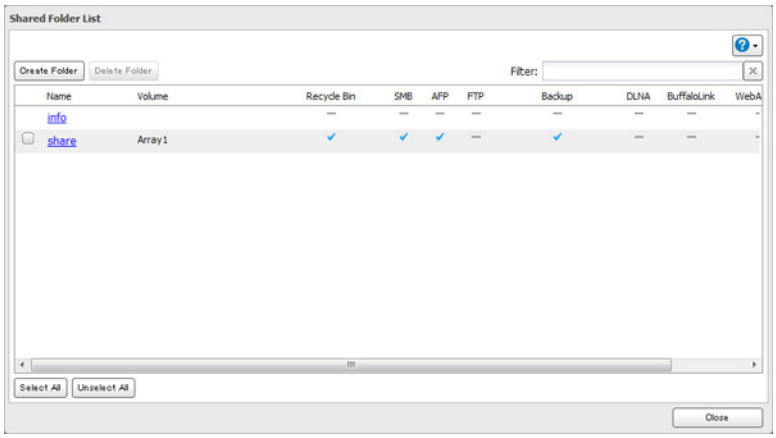


Notes:

- If you change the LinkStation's name, you will no longer be able to use domain users and groups or access restrictions. To repair this, rejoin the domain.
- If the LinkStation has joined a domain network, you cannot connect to the LinkStation via FTP.

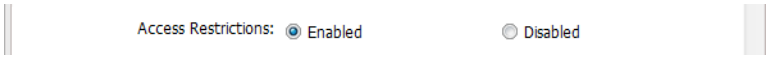
8 Click to the right of "Folder Setup".

9 Click a shared folder for which you want to set access restrictions.



10 Click *Edit*.

11 Enable "Access Restrictions".



12 Select the level of access for "Domain Users" or "Domain Groups" you added.

: Read and write access allowed : Read access allowed : Access prohibited

13 Click *OK*.

Notes:

- If both read-only and read & write permissions are given to a user, the user will have read-only access. The most restrictive attribute will apply.
- If domain username is more than 20 bytes long, the LinkStation truncates it to 20 bytes.
- The LinkStation supports a domain environment with a maximum of 1000 users and 1000 groups. 10,000 users and 10,000 groups can be downloaded from the domain controller but are not supported.
- To use the LinkStation as a member server in an NT or Active Directory domain, the LinkStation should be logged in to the domain and accessed from a computer that is not a member of the domain with a valid domain account.
- If the LinkStation is a member server of an NT or Active Directory domain, you cannot connect as a guest user via AFP.
- When you change the user or group settings on the domain controller, these changes may not take effect immediately on the LinkStation until it is rebooted.
- If your LinkStation is a member server in an NT or Active Directory domain and you change the authentication method to "Workgroup", the account on the domain controller will not be deleted automatically.
- If the LinkStation has joined a domain network, you cannot connect to it via FTP.

Delegating Authority to an External SMB Server

LinkStation on your network can be linked to an authentication server for centralized management of user accounts and passwords. The authentication server should be a TeraStation or another LinkStation.

Notes:

- Other external SMB authentication servers are not supported. Use a TeraStation or a LinkStation for the authentication server.
- For Windows 8, access by users and groups linked from the external authentication server will not be restricted.

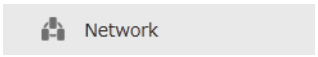
- When saving changes to the external authentication server settings, clicking "Yes" will convert all local users to external authentication users. If external authentication is disabled, local user passwords will need to be reconfigured.

1 In Advanced Settings, navigate to *File Sharing - SMB* and click the icon.

2 Click *Edit*.

3 Enable "SMB2 Protocol", then click *OK* twice.

4 In Settings, click *Network*.



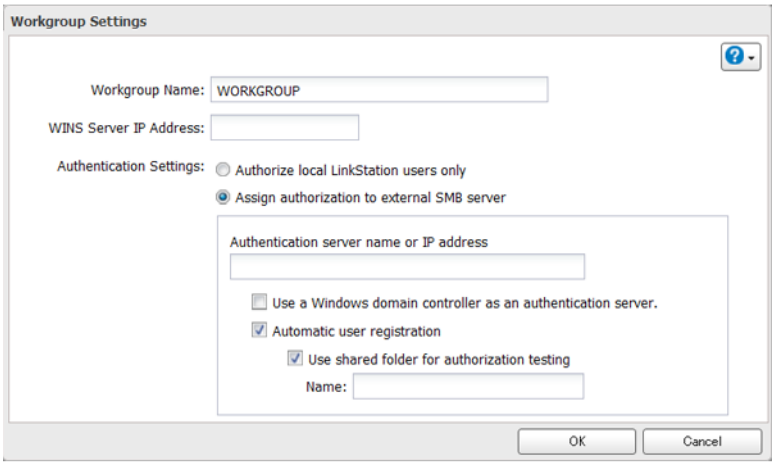
5 Choose *Workgroup/Domain*.

6 Click *Edit*.

7 Select "Workgroup".

8 Click *Next*.

9 Enter a workgroup name. Select "Assign authorization to external SMB server" and enter the authentication server's IP address (recommended) or name. Check "Automatic user registration" and "Use shared folder for authorization testing". Enter the name for authorization testing and click *OK*.



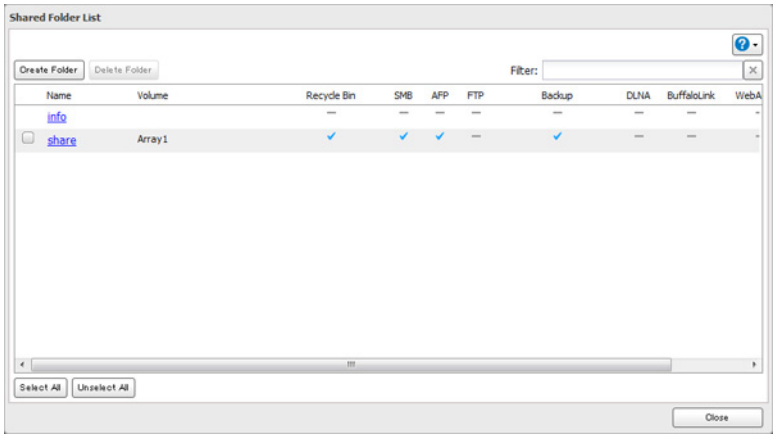
10 A shared folder for authentication has been created on the LinkStation. Users registered to the specified

authentication server are automatically registered as users on the LinkStation when they open the shared folder for authentication. You can also register users directly.

Note: Using external authentication may require the default security settings in Windows to be changed. An easy way to do this is to run the File Sharing Security Level Change Tool, available from www.buffalotech.com. This simple tool will let you change or restore your Windows security settings to work with external authentication.

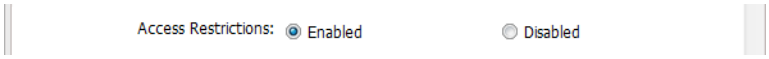
11 Choose *Folder Setup*.

12 Choose a shared folder to set access restrictions on.



13 Click *Edit*.

14 Enable "Access Restrictions".



15 Select the level of access:

: Read and write access allowed : Read access allowed : Access prohibited

16 Click *OK*.

Notes:

- If both read-only and read & write permissions are given to a user, the user will have read-only access. The most restrictive attribute will apply.
- If access restrictions are set for users and groups registered in the authentication server, guest or anonymous connection is not possible with AFP or FTP connections.
- Users who are automatically registered belong to the "power users" group. They can be added to other groups from within group settings.
- Access can be restricted to specific shared folders based on username.
- The names of registered users are listed in "Users" - "External Users". Deleting a server name may cause problems with authentication.
- When connecting through AFP or FTP, always use an IP address. Using a server name may cause problems with authentication.
- To specify a server from another subnet, enter its IP address.
- AFP and FTP connections do not support delegating authority to an external SMB server.

- Use AFP to access access-limited shared folders from OS X 10.7 instead of SMB. Enable "AFP" under "LAN Protocol Support" for the destination folders to use AFP.

Chapter 5 Managing Storage

RAID Arrays

The default RAID mode is RAID 0.

Notes:

- If you change the RAID mode, all data on the array is deleted. This is true for every procedure in this chapter. Always back up any important data before performing actions that affect your RAID.
- After the RAID mode is changed (except when creating a RAID 0 array or JBOD), the LinkStation performs a RAID check that will take about 10 hours per TB. File transfers are slower during this period. While the message "RAID I17 ARRAYx Resyncing" is displayed on NAS Navigator2, do not turn off the LinkStation. If you do, the RAID check starts over.

RAID 1

Combines 2 drives into a mirrored array. The available space in the array is the capacity of a single drive. Identical data is written to each drive. If a drive is damaged, data can be recovered by replacing the damaged drive. As long as one drive in the array remains undamaged, all data in the array can be recovered.

RAID 0

Combines 2 or more hard drives into a single array. The usable disk space is the total space of all drives used. This simple RAID mode offers faster performance than RAID modes that include parity. If a single drive in the array fails, then all data in the array is lost.

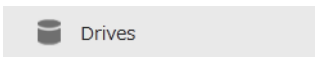
JBOD

This mode uses the hard drives inside the LinkStation as individual drives. The disk space you can use is the total capacity of all drives in the LinkStation. If any drive is damaged, then the data on that drive is lost.

Using JBOD

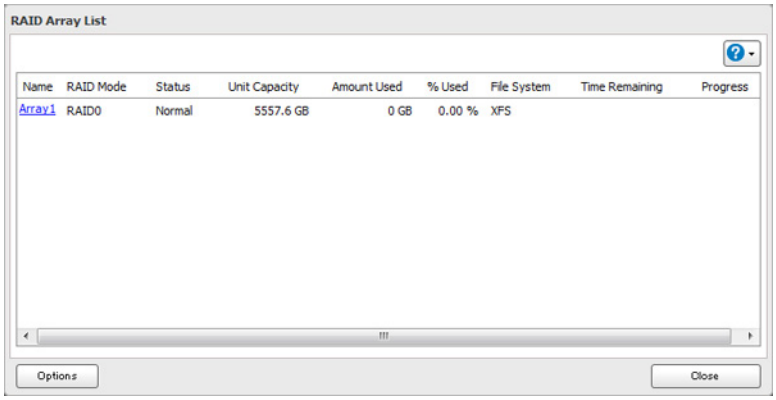
With JBOD, each hard drive in the LinkStation is addressed separately. To put drives from an array into JBOD mode, follow the steps below.

1 Click *Drives* in Advanced Settings.



2 Select *RAID*.

3 Select the array to delete.



4 Click *Delete RAID Array*.

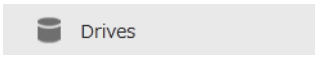
5 Step through the wizard to delete the array.

Once JBOD mode is configured, create shared folders on each drive to use them.

Changing RAID Mode

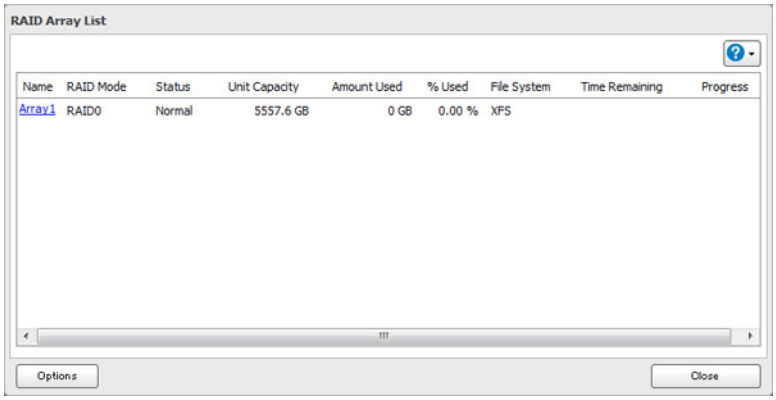
To change the RAID mode, first put the drives in JBOD mode.

1 Click *Drives* in Advanced Settings.



2 Select *RAID*.

3 Click the array to delete.



Note: If the "RAID Mode" is blank, the array is already in JBOD mode. Proceed to step 7.

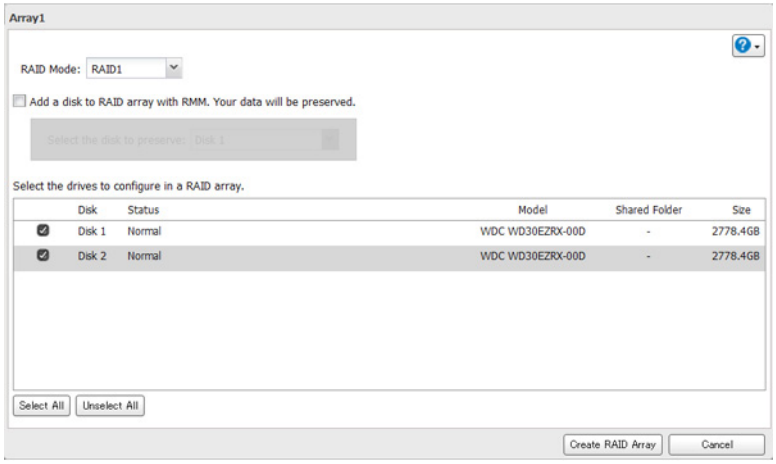
4 Click *Delete RAID Array*.

5 The "Confirm Operation" screen will open. Enter the displayed number, then click *OK*.

6 Click *OK*.

7 Choose the array to configure.

8 Select a RAID mode and the drives to be used, then click *Create RAID Array*.



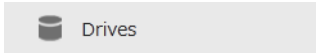
9 Step through the wizard to create the array.

Note: After changing the RAID mode, create a shared folder.

RMM (RAID Mode Manager)

With RMM, you can create or expand a RAID array without erasing the data on the drives.

1 Click *Drives* in Advanced Settings.



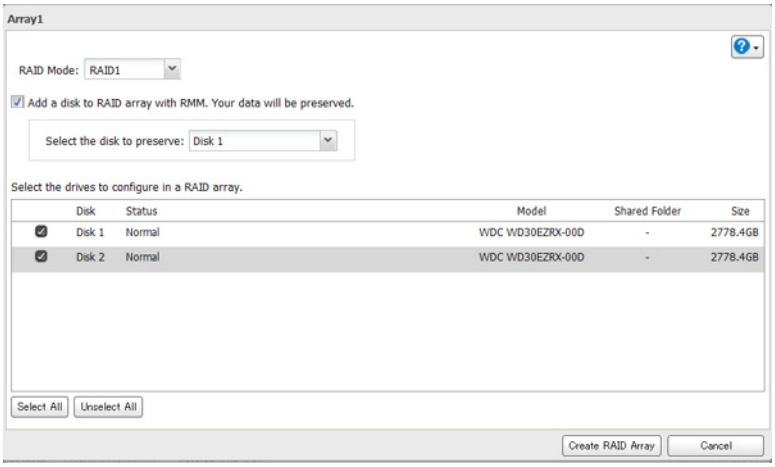
2 Select *RAID*.

3 Choose a RAID array.

4 Check "Add a disk to RAID array with RMM. Your data will be preserved.".

5 Select the drive whose data will be saved from the drop-down menu.

6 Check the drive to add to the RAID array.



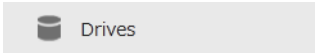
7 Click *Create RAID Array*. The "Confirm Operation" screen will open.

8 Enter the confirmation number, then click *OK*.

RAID Scanning

RAID maintenance scans your RAID array for bad sectors and if it finds any it automatically repairs them. For best results, run RAID maintenance regularly.

1 In Advanced Settings, click *Drives*.

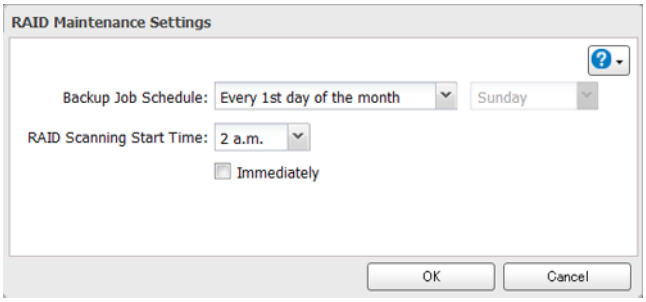


2 Move the RAID Scanning switch to the position to enable RAID Scanning.

3 Click the icon to the right of "RAID Scanning".

4 Click *Edit*.

5 Select the schedule for running RAID maintenance, then click *OK*.



Notes:

- Check "Immediately" to run RAID maintenance immediately.

- To stop a RAID scan, click *Abort RAID Scan*.

Adding an External Hard Drive

Connect an External Drive

Your LinkStation includes a USB port. You can connect an external drive to this port. It will appear as a shared folder on the LinkStation. Formatted drives are detected automatically. Unformatted drives should be formatted in Settings.

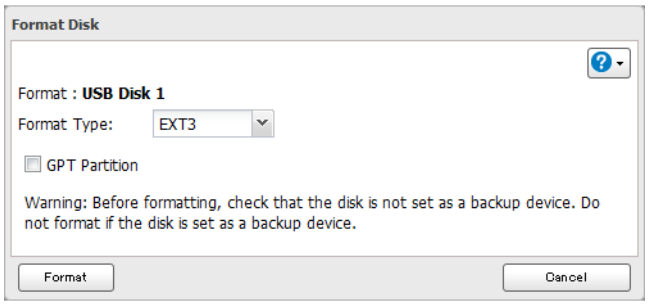
After a USB drive is recognized, Windows adds "usbdisk X" under the LinkStation in "Network", where "X" is the USB port where the hard drive is connected.

Notes:

- Hubs are not supported. Connect a single USB drive to the USB port.
- Backup data from Mac OS may include characters that cannot be written to FAT16 or FAT32 drives such as ".DS_ Store". For best results, reformat the drive before using it as a backup target.
- You can use the USB Device Server to connect a USB hub and up to 15 USB devices. However, with USB Device Server, the USB devices cannot be used for creating shared folders or act as LinkStation backup destinations.

Formatting External Drives

Formatted drives are detected automatically. If a drive is not formatted, format it from Settings. Refer to "Formatting Drives" for the procedure.



Notes:

- Do not turn off or disconnect power to the LinkStation while formatting a hard drive.
- A format may take anywhere from a few minutes to several hours depending on the size of your drives.
- The following format types are supported: FAT32 (recommended for connecting to computers), EXT3 (recommended for sharing with other LinkStations), XFS (recommended for adding additional external storage to a LinkStation), NTFS, and HFS+ (read-only, cannot format from Settings).

Access Restrictions on External Drives

You can set access restrictions on new drives. Refer to "Configuring Access Restrictions" for details.

Note: Even if a shared folder is not visible, you can still format the drive, run a disk check, and back up the new drive.

Compatible Information

The following devices are supported by the LinkStation

- USB storage devices
- Card readers (except for card readers that can recognize two or more memory cards)
- Digital cameras
- USB-connected UPSs
- USB printers

Buffalo external USB drives are recommended.

These devices are not supported.

- DUB and DIU series drives
- Hubs, mice, and keyboards

Connect only one device to the LinkStation's USB port. Some external drives with automatic power-on don't turn on automatically when connected to the LinkStation. Use their manual switch to turn them on. Be sure to connect only one bus-powered drive at a time. If there is insufficient bus power for your USB drive, connect its AC adapter. Note that only the first partition of a connected USB hard drive is mounted. Additional partitions are not recognized.

Dismounting Hard Drives

If the LinkStation is powered on, dismount external drives before unplugging them. You may dismount external drives with the function button, or any drives from Settings. If the LinkStation is off, then all drives are already dismounted and may be unplugged safely.

Notes:

- Do not dismount or disconnect an external drive while any drive is being formatted, accessed, or checked for errors, or while a RAID array is being created or deleted.
- If you unplug your external drives without dismounting them, Settings may still show "usbdisk" in *File Sharing - Folder Setup*. Reboot your LinkStation to clear it.

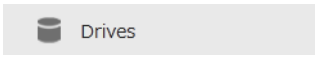
Dismounting with the Function Button

If the LinkStation is on, hold down the function button for 3 seconds. The white LED will go out as all attached USB drives are dismounted. You may now unplug them safely.

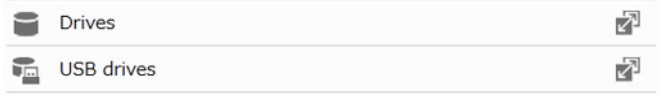
Note: Dismounting drives will also restart the services for FTP, AFP, SMB, the print server, BitTorrent, WebAccess, DLNA, and the iTunes server. Don't do this while files are being copied for accessed.

Dismounting from Settings

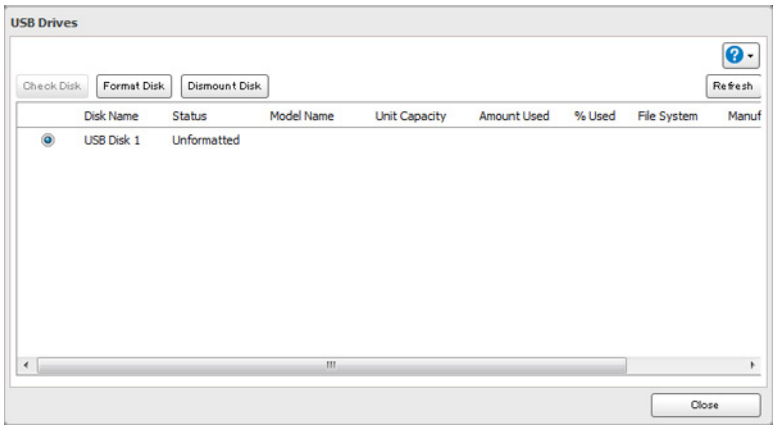
1 In Advanced Settings, click *Drives*.



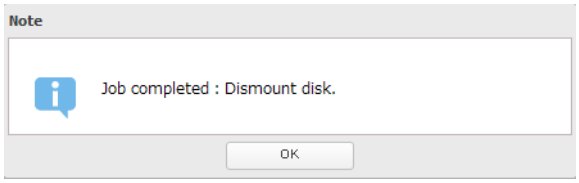
2 Click the icon to the right of "USB Drives".



3 Select the drive to dismount and click *Dismount Disk*. The "Confirm Operation" screen will open. Enter the displayed number, then click *OK*.



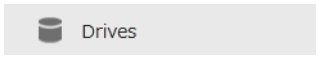
4 Unplug the USB device, then click *OK* when the following message is displayed.



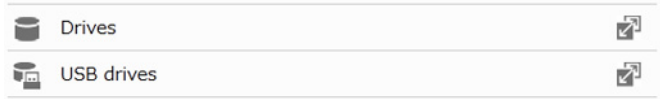
Checking Drives

A disk check tests the data on a drive in the LinkStation or connected via USB for integrity. Errors are fixed automatically. With large drives, a disk check may run for many hours. Shared folders cannot be accessed during a disk check. Do not turn off the LinkStation until the disk check is finished. Use the procedure below to run a disk check.

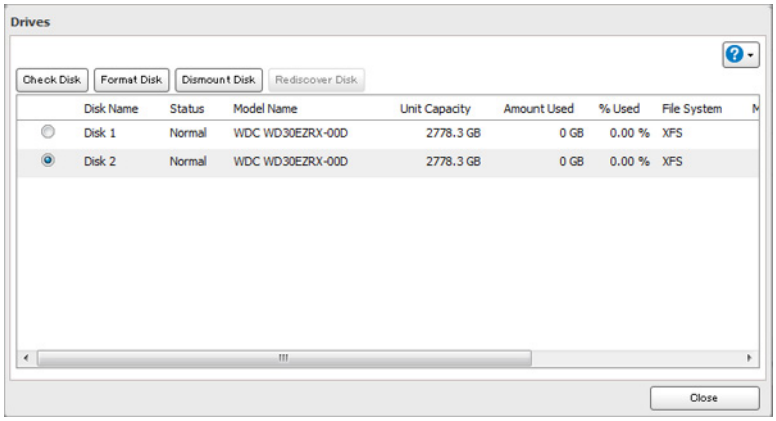
1 In Advanced Settings, click *Drives*.



2 Select *Drives* to check an internal drive or *USB Drives* to check an external drive.



3 Select the drives to test, then click *Check Disk*.

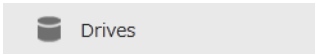


4 Click *Check*. You have the option of deleting information files from Mac OS during the check if desired.

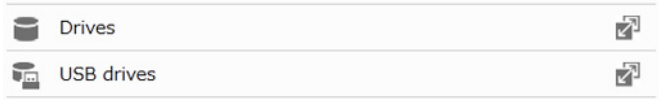
Formatting Drives

Note: Under some circumstances, data deleted when a drive is formatted can be recovered. To ensure that data is "gone forever", a format might not be sufficient. See "Erase Data on the LinkStation Completely".

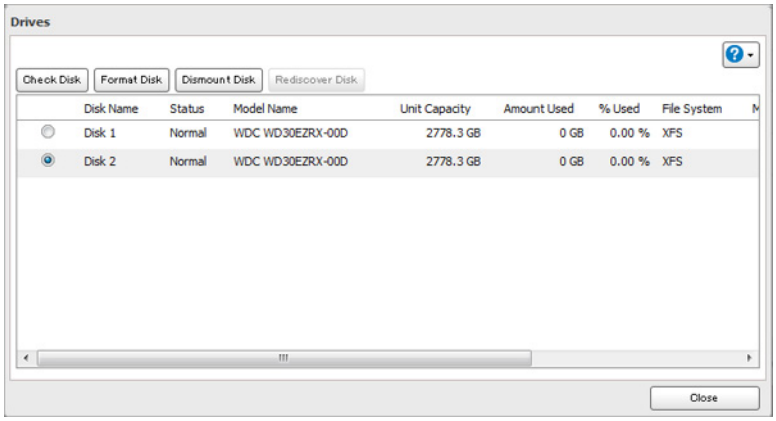
1 In Advanced Settings, click *Drives*.



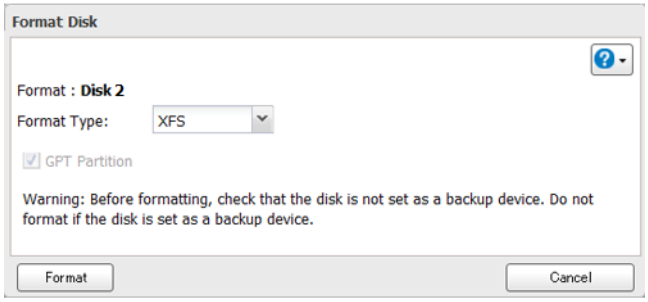
2 Select *Drives* to format an internal drive or *USB Drives* to format an external drives.



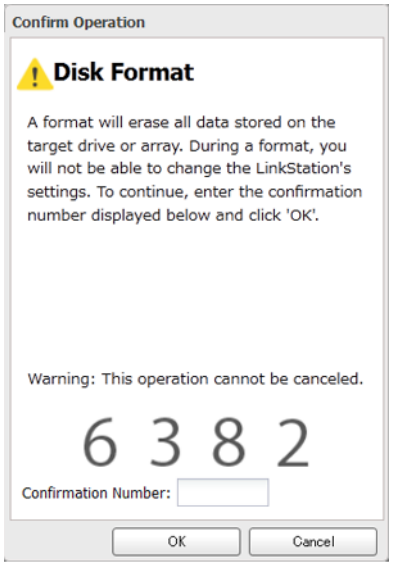
3 Select the drive to format, then click *Format Disk*.



4 Select a format type, then click *Format*.



5 The "Confirm Operation" screen will open. Enter the displayed number, then click *OK*.



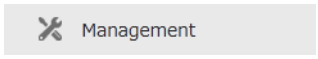
6 Depending on the size of your drive, the format may take several minutes to several hours to complete. The power LED will flash during the format. Shared folders cannot be accessed during a format. Do not turn off the LinkStation until the disk format is finished.

Erase Data on the LinkStation Completely

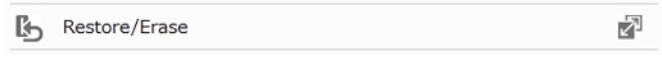
Under some circumstances, data from formatted drives can be recovered. The disk erasure process in this section does a much more thorough job of erasing data. This procedure is recommended for removing all data from a drive in a way that makes it nearly impossible to recover with current tools. All data on the drives is completely erased. The LinkStation will then be in the following state:

- All drives in JBOD mode
- An empty shared folder on each erased drive
- All settings returned to their default values
- All logs deleted

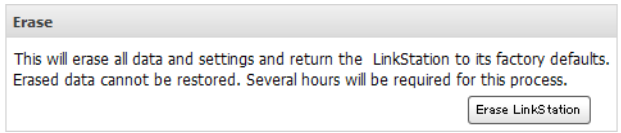
1 In Advanced Settings, click *Management*.



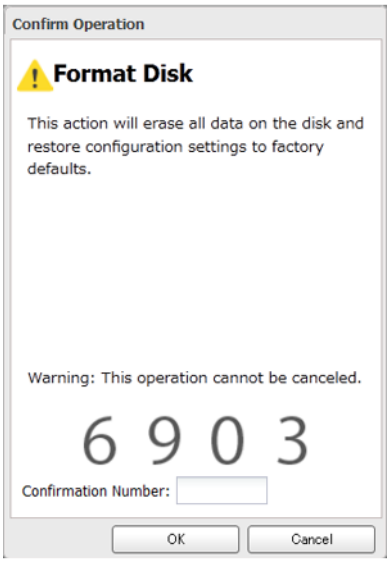
2 Select *Restore/Erase*.



3 Click *Erase LinkStation*.



4 The "Confirm Operation" screen will open. Enter the displayed number, then click *OK*.



5 All data on the LinkStation will be permanently erased.

Disk Quotas

Notes:

- When using quotas, disable the recycle bin or empty the trash folder often. The limited space includes the space used for trash.
- Quotas apply per drive or per array. If a quota is set to 1 GB, each array or drive can use a maximum of 1 GB.
- Quotas cannot be set for external drives connected to the LinkStation.

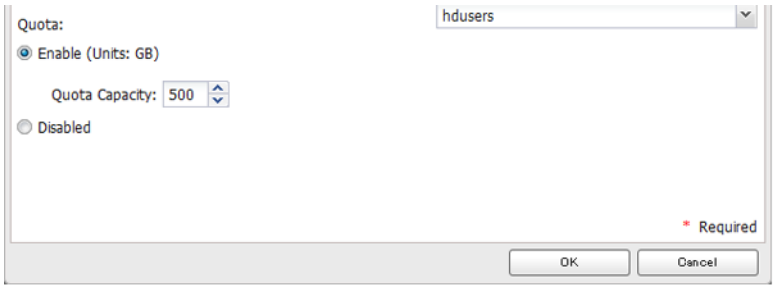
Quotas for Users

Follow this procedure to limit the shared folder disk space available for a user.

1 In Advanced Settings, click to the right of "Users".

2 Select the user whose space will be limited.

3 Enable quotas, choose the maximum space the user will be allowed to use, and click *OK*.



Note: If you change the primary group, restart the LinkStation to apply the quota settings.

4 Click *Close*.

5 Click the icon and select *Restart* to apply the quota settings.

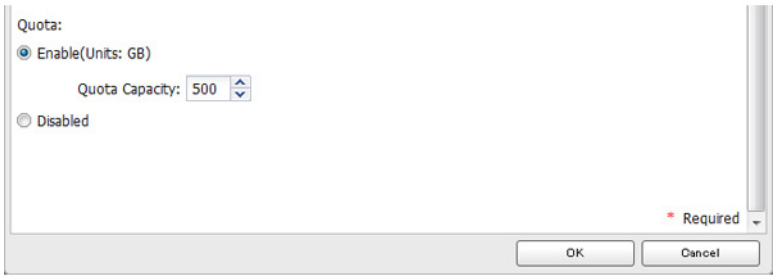
Quotas for Groups

Follow the procedure below to limit the space for shared folders that each group can use.

1 In Advanced Settings, click to the right of "Groups".

2 Select the group whose space will be limited.

3 Enable quotas, choose the maximum space the group is allowed, and click *OK*.



4 Click *Close*.

5 In Advanced Settings, click to the right of "Users".

6 Change the user's primary group to the group with the quota, then click *OK*.

7 Click *Close*.

8 Click the icon and select *Restart* to apply the quota settings.

Hard Drive Replacement

If a drive fails, NAS Navigator2 and Settings will show a error message.

Notes:

- Do not unplug a drive if NAS Navigator2 or Settings doesn't show an error message. Dismount it first or shut down the LinkStation before swapping a working drive. If you remove the drive without properly dismounting it, data may be lost or the LinkStation may malfunction.
- The replacement drive should be a OP-HD/LS series drive, available from Buffalo. Using a different drive might cause your LinkStation to malfunction.

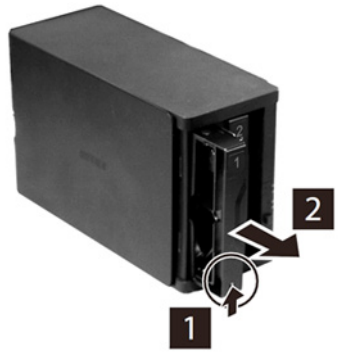
- Use a Buffalo OP-HD/LS series drive of the same size or larger for the replacement drive. If a larger drive is used, the extra space will not be usable in a mirrored RAID array.
- To avoid damaging the LinkStation with static electricity, ground yourself by touching something made of metal before handling any sensitive electronic parts.
- After a drive is replaced, it takes about 30 minutes before normal file reading and writing are restored. Settings may not be accessible during this period.
- Do not change the order of the hard drives in the LinkStation. For example, pulling out drive 1 and replacing it with drive 2 may cause data to be corrupted or lost.
- If a new drive is not recognized after installing it, click *Rediscover Disk* in Settings.

Hard Drive Replacement Examples

1 Turn the LinkStation off and remove all cables.

2 Squeeze the left side of the front panel and pull the panel off.

3 Push the failed drive's cartridge up and remove it from the LinkStation.

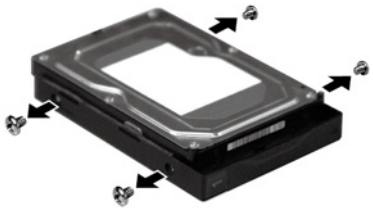


Notes:

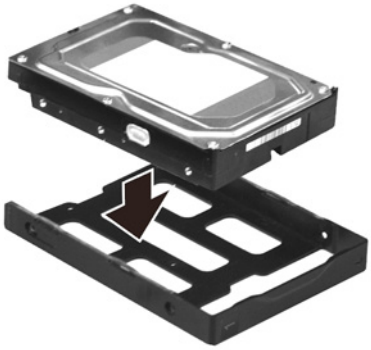
- Do not press hard on the top of the LinkStation.
- Pull the drive straight out the front of the chassis.

Hard drives that have not triggered an error message are still on. Do not unplug or remove them without dismounting them first.

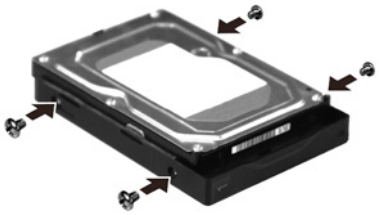
4 Remove the drive from the cartridge.



5 Install a new Buffalo OP-HD/LS series drive in the cartridge.

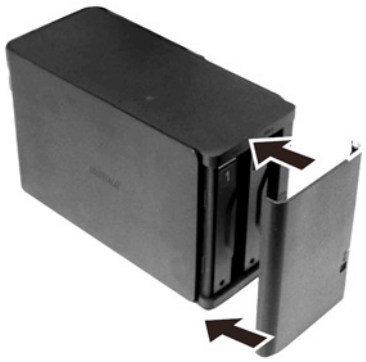


6 Replace the four screws.



7 Insert the new drive in the empty slot.

8 Close the front panel.



9 Connect all cables, then turn on the LinkStation.

10

For RAID 0

Navigate to *Drives - RAID* in Advanced Settings. Select the array with the error, then click *Delete RAID Array*.

Navigate to *Drives - Drives*. Choose the new drive (the unformatted one) and format the drive. After formatting the drive, change the RAID mode.

For RAID 1

Navigate to *Drives - RAID* in Advanced Settings. Select the array with the error, then click *Recover RAID Array*. Follow the procedure on the screen to complete the hard drive replacement.

For JBOD

Navigate to *Drives - Drives* in Advanced Settings. Format the new drive and create a shared folder before use.

Chapter 6 Backup

Back Up from the LinkStation

You can back up LinkStation folders to:

- A different folder on the LinkStation
- Another LinkStation on the network
- Another TeraStation on the network

Preparing a Backup Destination

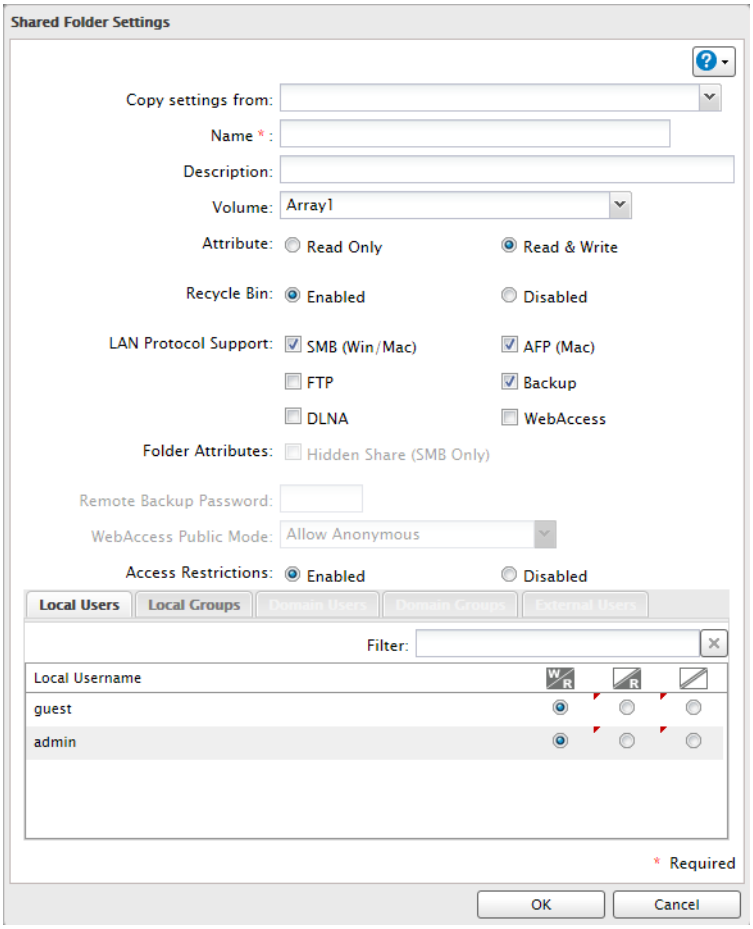
First, configure a folder as a backup destination.

1 In Advanced Settings, navigate to *Folder Setup*.

2 Choose the folder to set as a backup destination.

3 Click *Edit*.

4 Under "LAN Protocol Support", check "Backup", then click *OK*.

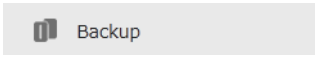


Note: To configure a password, enter it in the "Remote Backup Password" field. Leave this field blank if you don't want a password. If the target device is configured with a backup password, you can search for the password from the backup source.

Backing up to a LinkStation or TeraStation on another network when connected by a VPN

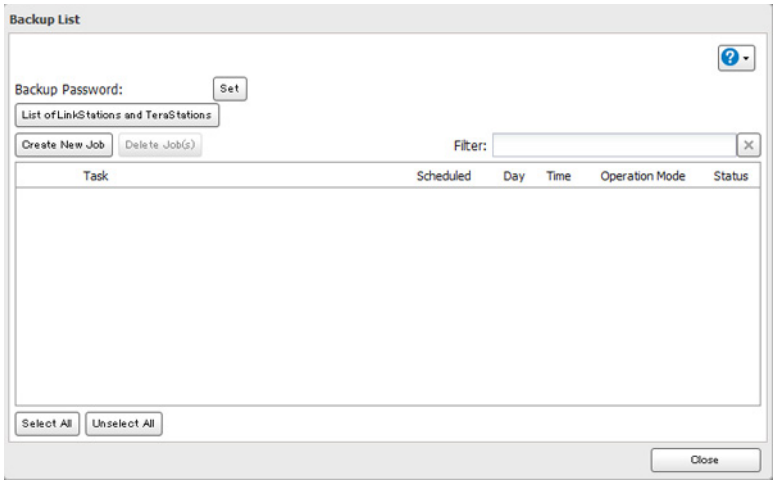
You can back up to a LinkStation or TeraStation on another network as long as the two networks are connected by a VPN. Follow this procedure to enter the IP address or hostname of the target LinkStation or TeraStation.

1 In Advanced Settings, click *Backup*.

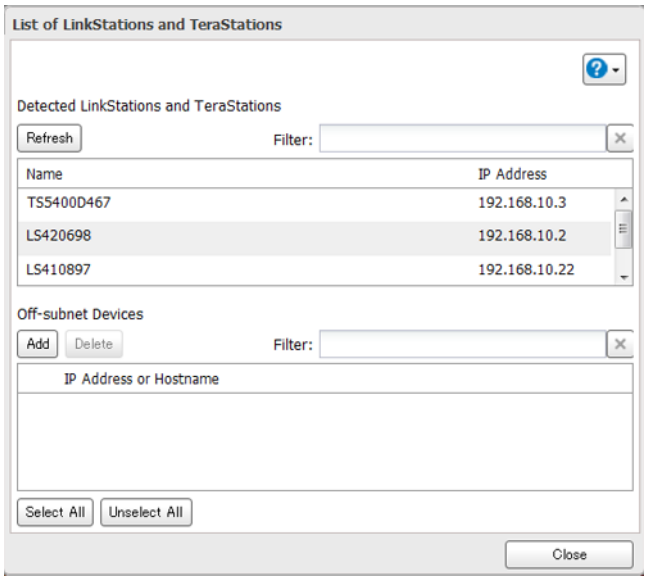


2 Click to the right of "Backup".

3 Click *List of LinkStations and TeraStations*.



4 Check the IP address of the LinkStation or TeraStation that you want to set as the backup target. Click *Add*, enter the IP address of the target LinkStation or TeraStation, and click *Close*.



If your setup meets these requirements, you don't have to configure these settings.

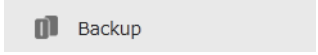
- The source and target LinkStations are on the same network.
- No backup password is set for the target LinkStation.
- No LinkStation from outside the subnet, connected by a VPN, is used.

Notes:

- To back up data between LinkStations or TeraStations on a network using jumbo frames, make sure that both devices are configured to use identical (or similar) Ethernet frame sizes. If Ethernet frame sizes are significantly different, the backup job may not be properly performed. In such a case, select the default frame size (1518 bytes).
- You can also specify hostname by a fully qualified domain name (FQDN).

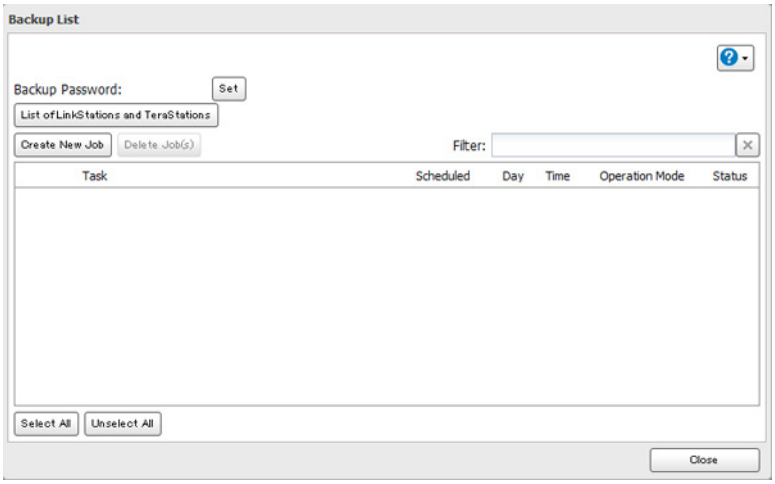
Configuring a Backup Job

1 In Advanced Settings, Click *Backup*.



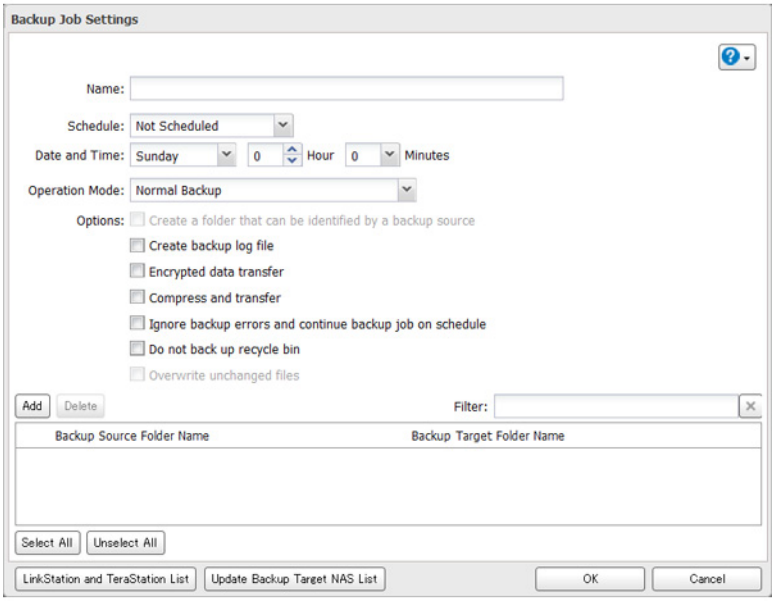
2 Click to the right of "Backup".

3 Click *Create New Job*.



Note: Up to 8 backup jobs can be configured.

4 Select backup settings such as date and time to run.



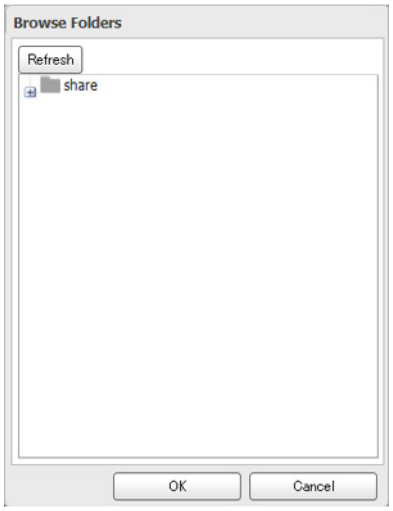
Note: The following types of backup jobs may be selected:

Type	Files Included
Normal Backup	All files in the source will be backed up to the destination.
Overwrite Backup (Append Backup)	The first time the backup job runs like a normal backup. In subsequent backups, files added to the source as well as files deleted from the source are kept in the backup folder.
Overwrite Backup (Differential Backup)	The first backup job runs like a normal backup. As each additional backup job runs, files are added to and deleted from the backup folder. The backup destination folder is always the same size as the backup source folder.

5 Click *Add*.

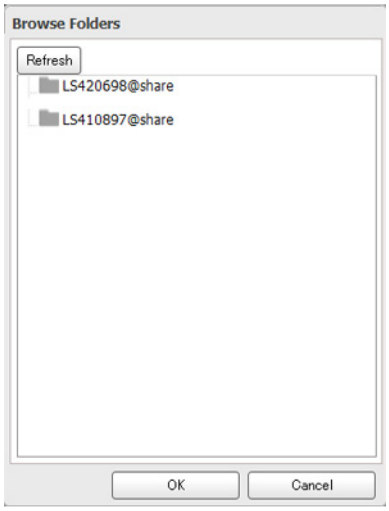
6 Click *Browse* under "Backup Source Folder Name".

7 Select the shared folder that will be the backup source, then click *OK*.



8 Click *Browse* under "Backup Target Folder Name".

9 Select the backup target and click *OK*.



10 Click *OK*.
Tasks added to "Backup List" are displayed.

11 Click *Close*.

Backing Up Your Mac with Time Machine

Time Machine is a backup program included with Mac OS. Configure your LinkStation as shown to use Time Machine.

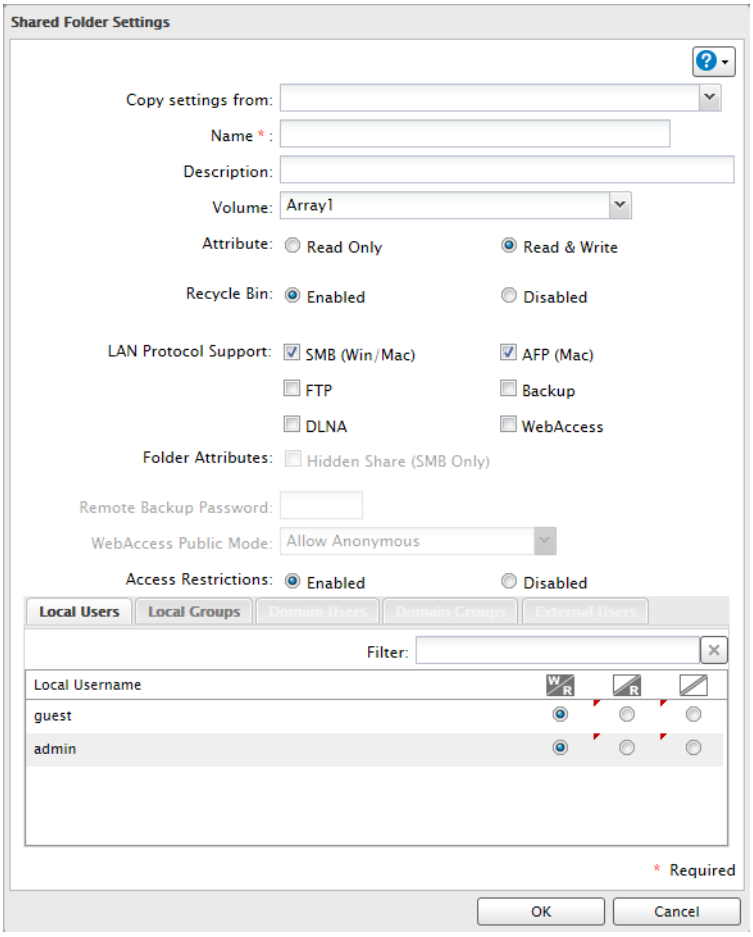
1 Make sure that AFP is enabled in Advanced Settings. The AFP switch should be in the On position.

2 Choose *Folder Setup*.

3 Choose a shared folder as your backup destination for Time Machine.

4 Click *Edit*.

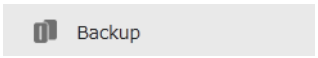
5 Select *AFP* from "LAN Protocol Support" and click *OK*.



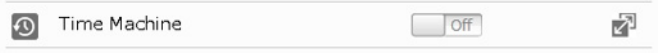
6 Click *OK*.

7 Click *Close*.

8 Click *Backup*.

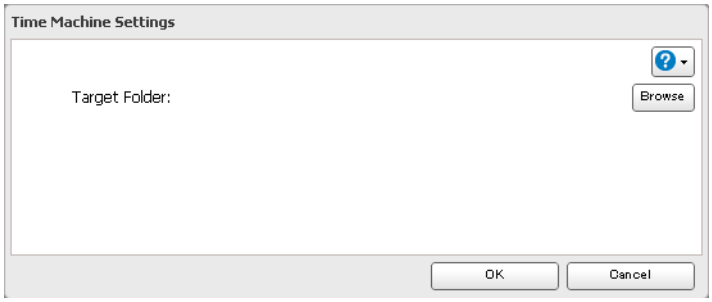


9 Click the icon to the right of "Time Machine".

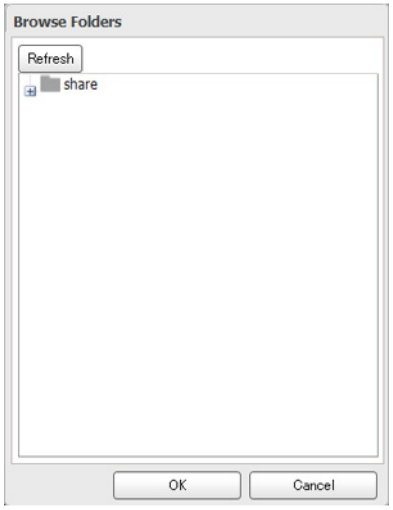


10 Click *Edit*.

11 Click *Browse*.



12 Select the shared folder that you set in the previous step, then click *OK*.



13 Click *OK*.

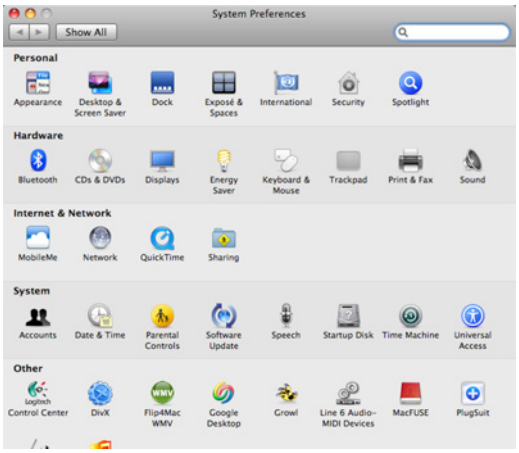
14 Click *OK*.

15 Move the Time Machine switch to the

position to enable Time Machine.

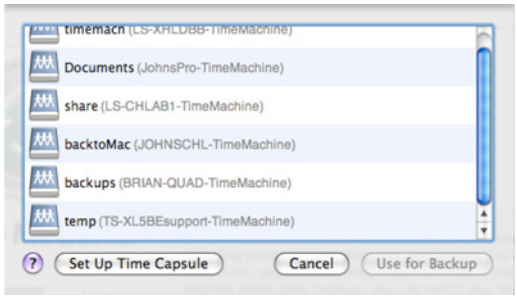
16 On the Mac, open *System Preferences*.

17 Click *Time Machine*.

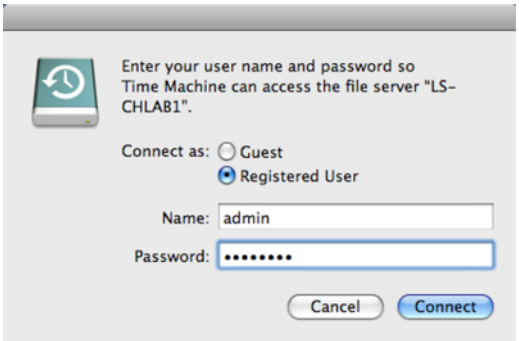


18 Click *Choose Backup Disk*.

19 Select the LinkStation, then click *Use for Backup*.



20 Enter a username and password with the rights to access the shared folder of the LinkStation, then click *Connect*.



Note: If access restrictions are not configured on the target share, log in with the administrator account. The default username and password for the administrator account are "admin" and "password". If access restrictions are

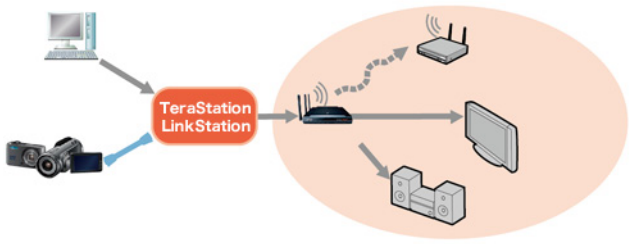
configured, log in with an account with write privileges.

21 Time Machine will count down from 120 seconds and the backup will begin.

Chapter 7 Multimedia

DLNA

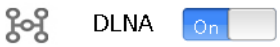
DLNA is a set of guidelines for sharing digital media. The LinkStation includes a DLNA server compliant with the DLNA guidelines. The movies, photos, and music saved on this product can be played back on DLNA-compliant TVs, stereo equipment, game consoles, and other devices within the network.



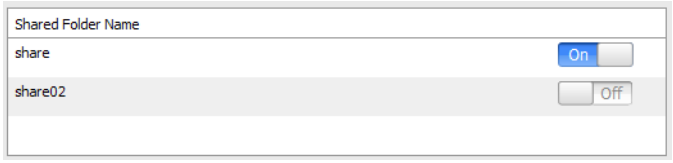
Configuration from Easy Admin

1 Click the ⚙ icon for "DLNA".

2 Move the DLNA switch to the On position to enable DLNA.



3 Move the switch for the folder you'll use for DLNA media to the On position as well.



4 Click *Apply*.

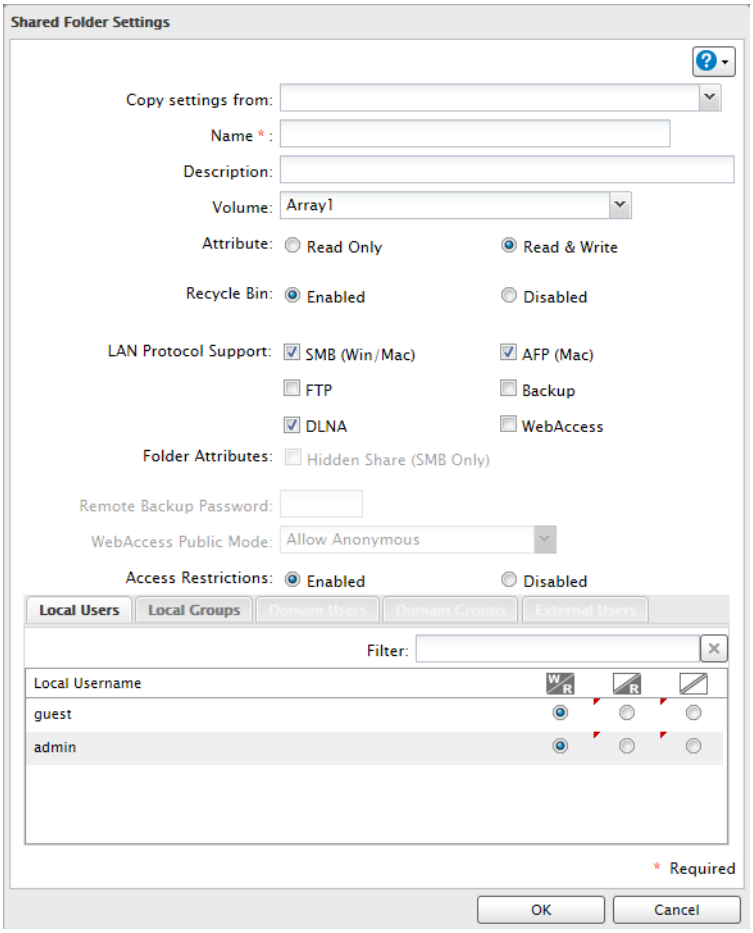
Configuration from Advanced Settings

1 Navigate to *File Sharing - Folder Setup*.

2 Select the folder that you want to share with media players and other DLNA-compatible devices.

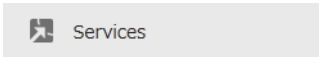
3 Click *Edit*.

4 Enable "DLNA" under "LAN Protocol Support", then click *OK*.



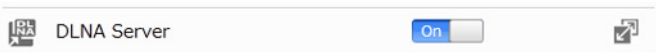
5 Click *Close*.

6 Click *Services*.



7 Move the DLNA Server switch to the

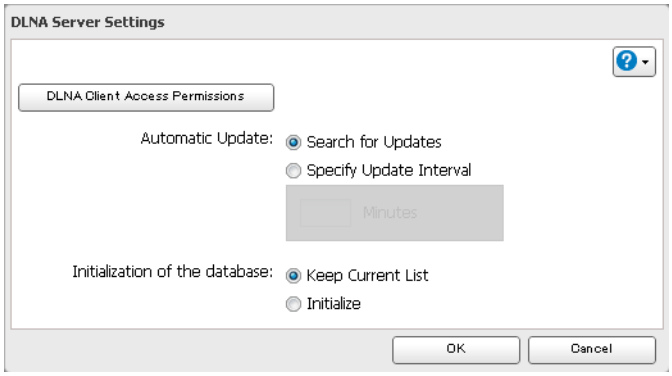
position to enable DLNA.



8 Click the icon to the right of "DLNA Server".

9 Click *Edit*.

10 Select the desired settings and click *OK*.



Play Files

To play back content from a DLNA-compatible device:

1 Connect the DLNA-compatible device to the same network as the LinkStation and turn it on.

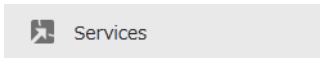
2 Select the LinkStation in the software of the DLNA-compatible device.

3 Select the content to be played back.

Connected DLNA-compatible Devices

Follow the procedure below to view the DLNA-compatible devices connected to your LinkStation.

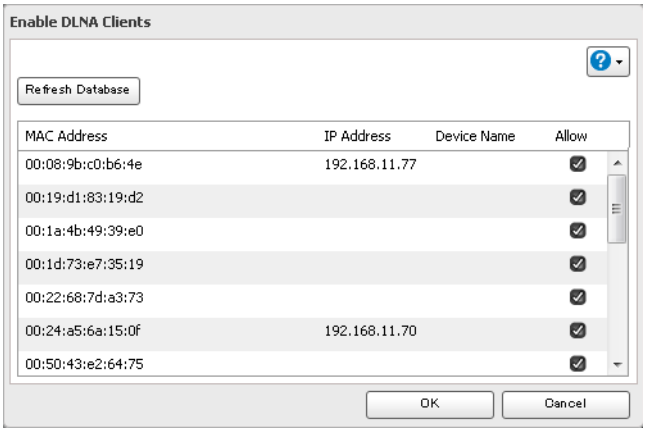
1 In Settings, click *Services*.



2 Click the icon to the right of "DLNA Server".

3 Click *DLNA Client Access Permissions*.

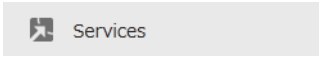
4 A list of the MAC addresses, IP addresses, and device names of the DLNA-compatible devices connected to the same network as the LinkStation is displayed. If your device is not listed, click *Refresh Database*.



Streaming to DLNA-compatible Devices

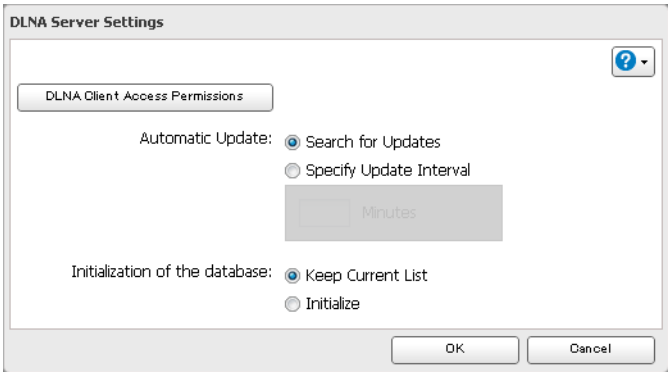
When new movies, photos, and music files are added to the LinkStation's DLNA folder, the database must be updated before the new file can be streamed. By default, the database is updated when the files are stored in the LinkStation. You can change this interval or update the database manually.

1 Click *Services* in Advanced Settings.



2 Click the icon to the right of "DLNA Server", then click *Edit*.

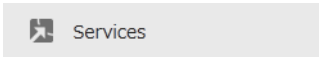
3 You may change the update interval, or select *Refresh Database* to update the database immediately.



Disabling Playback from Specific Device

You may block specific DLNA devices from playing back media content.

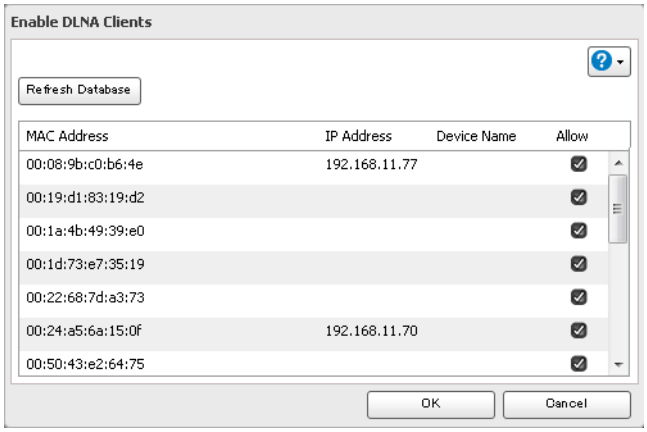
1 In Settings, click *Services*.



2 Click the icon to the right of "DLNA Server".

3 Click *DLNA Client Access Permissions*.

4 Uncheck the devices you do not want to allow to play media and click *OK*.



Supported File Types

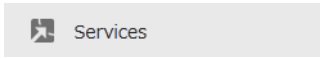
The LinkStation supports DLNA streaming of files with the extensions below.

Type	File Extensions
Video Files	mpe, mpeg, mpeg2, mpg, m2p, tts, m2ts, m2t, mts, m1v, m4v, mp4, mov, wmv, avi, divx, xvid, asf, dvr-ms, vob, 3gp, vdr, spts, tp, ts
Picture Files	jpg, jpeg, png, bmp, gif, tif, tiff, yuv
Music Files	mp3, wma, wav, lpcm, pcm, ogg, m4a, mp4, 3gp, flac, m3u, mpa, aac, apl, ac3, aif, aiff, mp2, mp1

iTunes Server

If iTunes server is enabled, computers on your network with iTunes can play music files stored on the LinkStation and transfer them to iPod, iPhone, and iPad devices. The iTunes server supports playback from up to five computers.

1 In Settings, click *Services*.

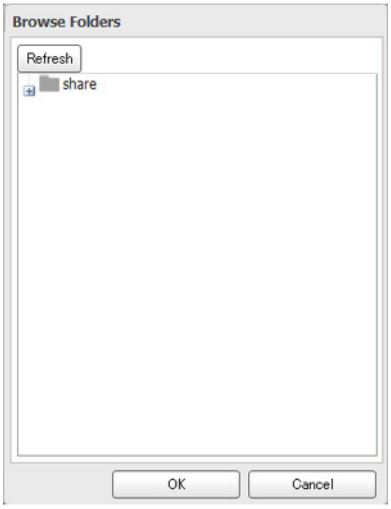


2 Click the icon to the right of "iTunes Server".

3 Click *Edit*.

4 Click *Browse*.

5 Select the shared folder that you want to make available to iTunes, then click *OK*.



6 Click *OK*.

7 Make sure that the iTunes server is enabled. The iTunes server switch should be in the On position.

BitTorrent

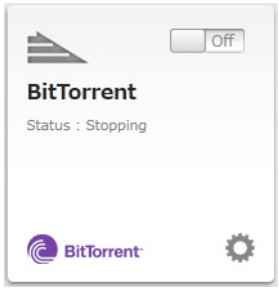
BitTorrent is software for downloading large files quickly. The information in this chapter is for users who are familiar with BitTorrent.

Notes:

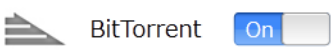
- Use compatibility mode to use "Download Manager" with Windows 8.
- The download manager is similar to "µTorrent".

Configuration from Easy Admin

1 Click *BitTorrent*.



2 Move the BitTorrent switch to the On position to enable BitTorrent.

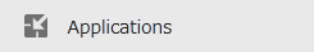


3 Select the shared folder to save files downloaded via BitTorrent from the drop-down list, then click *Apply*.

4 Go back to home and click *BitTorrent* to open the download manager. The default username is "admin" and the default password is blank (no password).

Configuration from Advanced Settings

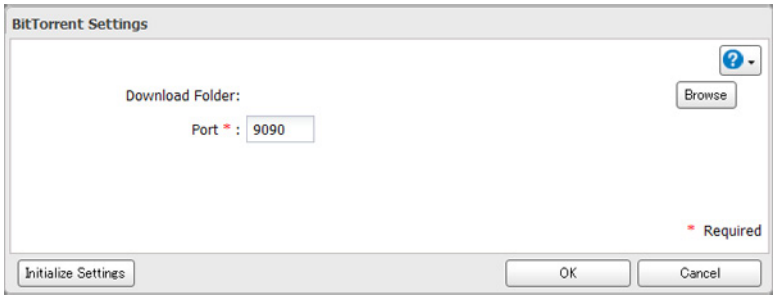
1 Click *Applications* in Settings.



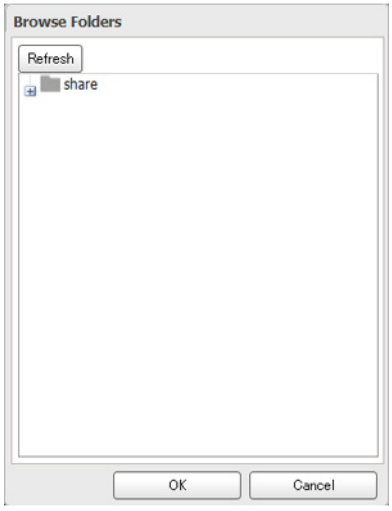
2 Click the icon to the right of "BitTorrent".

3 Click *Edit*.

4 Click *Browse*.



5 Select the shared folder where the downloaded file will be saved, then click *OK*.



6 Enter the port number, then click *OK*.

7 Move the BitTorrent switch to the On position to enable BitTorrent.

8 Click the icon to the right of "BitTorrent".

9 Click *Open Download Manager*. The default username is "admin" and the default password is blank (no password).

10 The download manager will open.

Connecting a Printer

You can connect a printer to the USB port on the LinkStation.

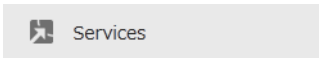
Notes:

- Only one USB printer can be connected to the LinkStation.
- Bidirectional communication is not supported i.e., remaining ink quantities and other printer status information is not supported.
- If a multifunctional printer is connected, only the printer function can be used. Other functions such as scanning will not be available. If you need bidirectional communication or multifunction features such as scanning to work, connect the printer with USB Device Server instead.
- The print server does not support Mac OS.

Settings up a Printer with Windows 8, Windows 7, or Windows Vista

1 Connect a printer to the LinkStation's USB port, then turn the printer on.

2 In Advanced Settings, click *Services*.

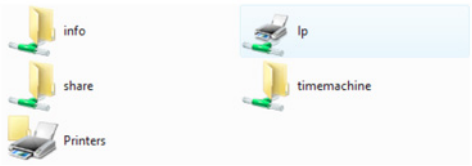


3 Move the Print Server switch to the position to enable the Print Server.

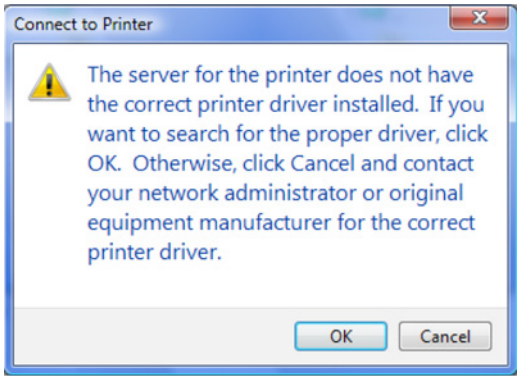
4 Refer to the manual supplied with the printer and install the printer drivers.

5 Launch NAS Navigator2. Double-click your LinkStation's icon.

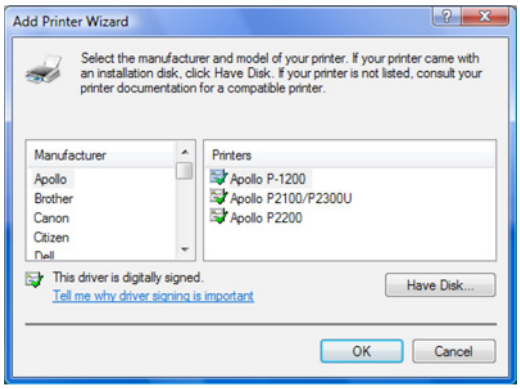
6 Double-click the icon of the connected printer (shared name is displayed).



7 Click *OK*.



8 Select your printer, then click *OK*.

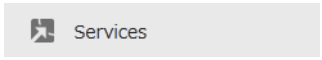


9 Register the printer.

Setting Up a Printer with Windows XP

1 Connect a printer to the LinkStation's USB port, then turn the printer on.

2 Click *Services* in Advanced Settings.



3 Move the Print Server switch to the

position to enable the Print Server.

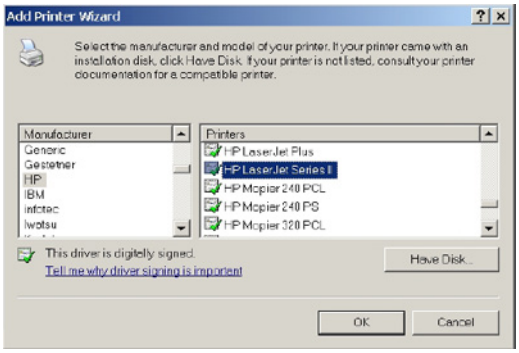
4 Refer to the manual supplied with the printer.

5 Launch NAS Navigator2. Double-click your LinkStation's icon.

6 Double-click your printer icon.

7 When "The server for the printer does not have the correct printer driver installed. If you want to search for the proper driver, click *OK*." displays, click *OK*.

8 Select the driver connected to the LinkStation, then click *OK*.



9 Register the printer.

USB Device Server

USB Device Server lets you use USB devices connected to the LinkStation with multiple computers.

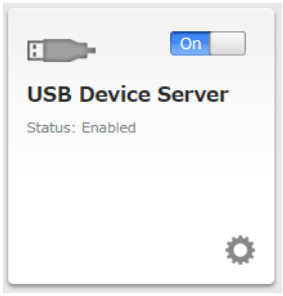
Configuration

1 Install the driver and software by connecting the USB device to the computer.
Remove the USB device after installation is completed.

2 Connect the USB devices to the LinkStation's USB port.

Note: With USB Device Server enabled, you may connect a single USB hub to the LinkStation. Up to 15 USB devices may be connected to the hub. Don't connect more than on bus-powered drive at a time. Use a separate AC power connection for each device if possible. Connecting more than one bus-powered device at a time may damage both the LinkStation and the devices.

3 In Settings, move the USB Device Server switch to the On position to enable USB Device Server.



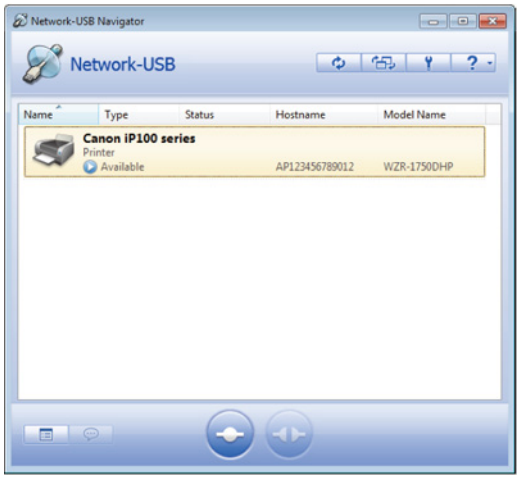
Note: When the USB Device Server is enabled, other functions that use the USB port won't be available.

4 To install Network-USB Navigator, click *USB Device Server* in Easy Admin or navigate to *Services - USB Device Server - USB Device Server* in Settings. You'll need administrator privileges to install the software.

Connecting with Network-USB Navigator

1 Launch Network-USB Navigator.
For Windows:
Navigate to *(All) Programs - BUFFALO - Network-USB Server*, then click *Network-USB Navigator*. On Windows 8, click *Network-USB Navigator* from the start screen.
For Mac:
Navigate to *Macintosh HD - Applications - BUFFALO - Device Server - Network-USB Navigator*.

2 Select the USB device, then click the button to connect.



3 The selected USB device will install automatically.

Refer to the help by clicking the button for more details about the software.

Note: Only one computer can access the USB device at a time.

Disconnecting USB Devices

Select the USB device, then click the icon to disconnect. Make sure that no one else is using the USB device before disconnecting it.

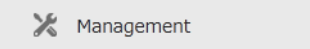
Chapter 8 Advanced Features

Email Notification

Your LinkStation can send your email reports daily, or when settings are changed or an error occurs. Notification emails may be triggered by any of the following events:

- Hard drive status at scheduled time
- Backup job completed
- RAID error
- Fan error
- Hard drive read error

1 In Advanced Settings, click *Management*.

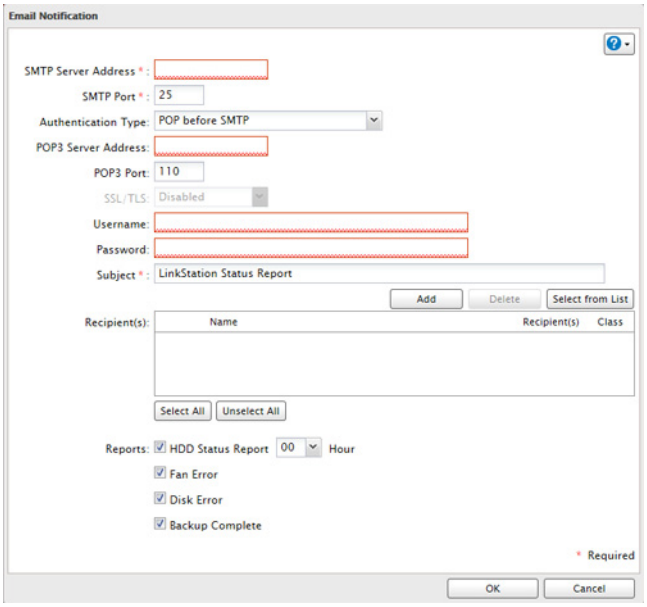


2 Move the Email Notification switch to the On position to enable Email Notification.

3 Click to the right of "Email Notification".

4 Click *Edit*.

5 Enter your mail server settings and choose what events will trigger notification. Click *OK* to send a test email.



Restoring Factory Defaults

To initialize the LinkStation to its factory default, follow this procedure.

Initializing with the Function Button

1 Turn off the LinkStation.

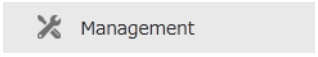
2 Turn the LinkStation on with holding down the function button.
The function LED will flash white.

3 Press the function button again while the LED is flashing.
The LinkStation will reboot automatically. When the LED changes to a steady white, the initialization has been done.

Note: The following settings will be initialized: admin username, admin password, IP address, and Ethernet frame size.
To disable initializing username and password, navigate to *Management - Restore/Erase - Init Button Settings* and select "Keep current admin username and password".

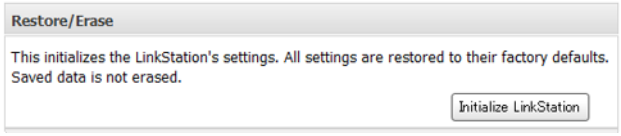
Initializing from Settings

1 In Advanced Settings, click *Management*.



2 Click to the right of "Restore/Erase".

3 Click *Initialize LinkStation*.

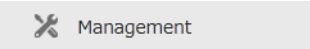


4 The "Confirm Operation" screen will open. Enter the displayed number, then click *OK*.

Online Update

If a new firmware is available, a message is displayed when the LinkStation boots. You can update the firmware by the following way:

1 In Advanced Settings, click *Management*.



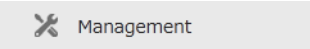
2 Choose *Update*.

3 Click *Install Update*.

Name, Date, Time and Language

Configure the LinkStation's hostname, date, time, and language as follows.

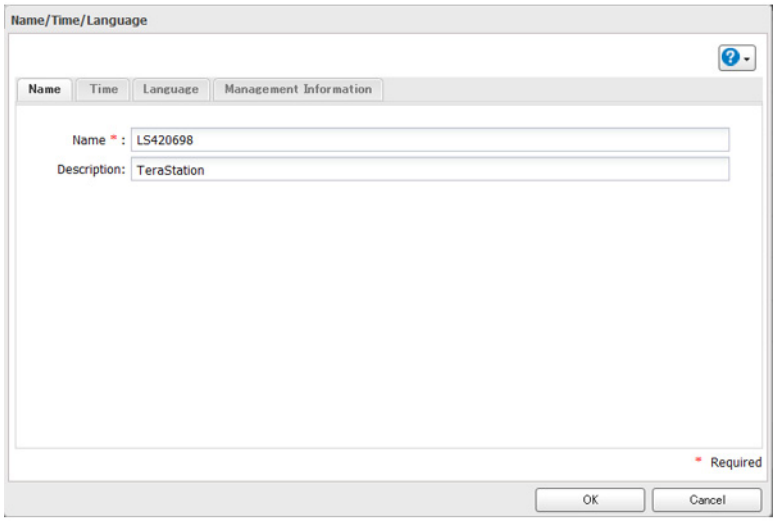
1 In Advanced Settings, click *Management*.



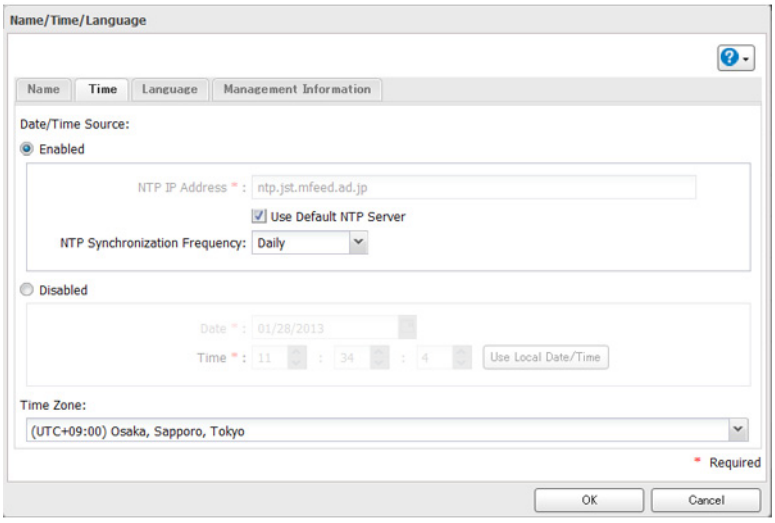
2 Open *Name/Time/Language*.

3 Click *Edit*.

4 Click the *Name* tab, then configure the LinkStation's name and description.



5 Click the *Time* tab.



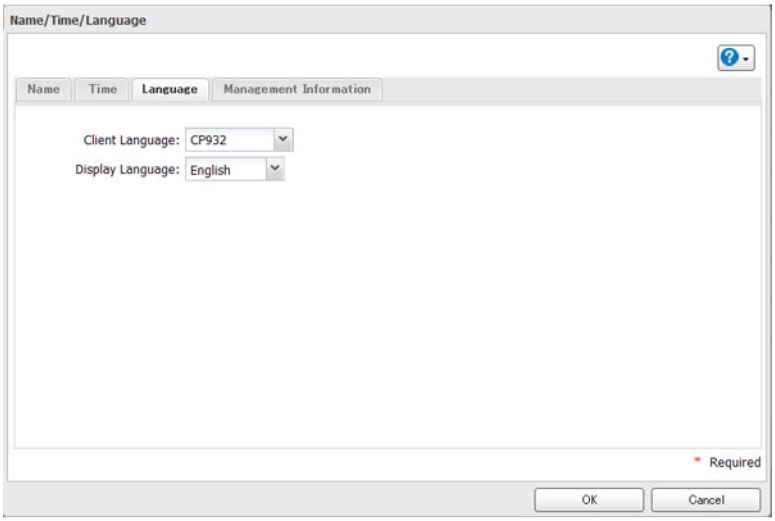
By default, the LinkStation adjusts its clock automatically by using a default NTP server.
This NTP server belongs to Internet Multi Feed Inc. For more information, visit http://www.jst.mfeed.ad.jp.
You can select a different NTP server by clicking *Name/Time/Language* on the "Management" screen. The "Name/Time/Language" screen opens.

- Click *Time*.
- Click *Edit*.
- Uncheck *Use Default NTP Server* and enter a new NTP IP address.
- Click *OK*.

If NTP is not used, enter the time and date manually. Click *Use Local Date/Time* to import the time and date from your computer.
In certain cases, the DNS server address must be set in order to access the NTP server.

Note: The internal clocks of the LinkStation and other devices on your network may run at slightly different speeds. Over a long period of time your network devices may show somewhat different times, which can cause network problems. If clocks on your network vary by more than 5 minutes it may cause unexpected behavior. For best results, keep all clocks on the network set to the same time by adjusting them regularly, or use an NTP server to correct them all automatically.

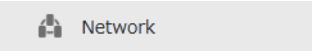
6 Click the *Language* tab.
Select the language to be used in the Windows client, then click *OK*.



Jumbo Frames

If your other network devices support it, you may be able to increase network performance with jumbo frames.

1 In Advanced Settings, click *Network*.

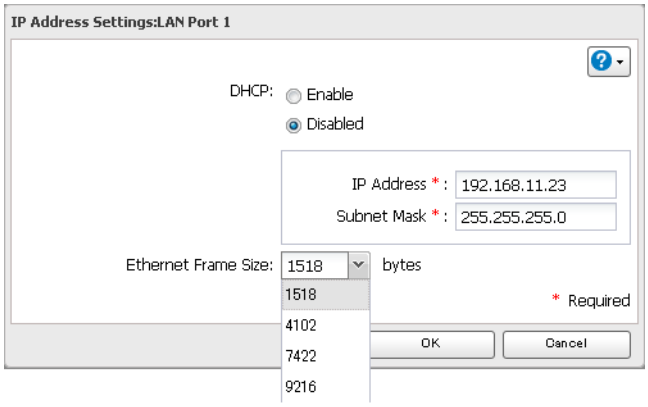


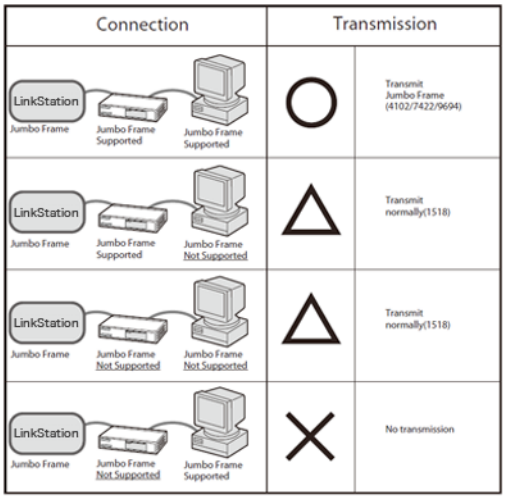
2 Click to the right of "IP Address".

3 Click the LAN port where the jumbo frames will be used.

4 Click *Edit*.

5 Select "Ethernet Frame Size", then click *OK*.





Changing the IP Address

Normally, the LinkStation's IP address is set automatically from a DHCP server on your network. If you prefer, you can

set it manually. To change the LinkStation's IP address settings, your computer should be connected to the same router (subnet) as the LinkStation and should be running NAS Navigator2.

Note: NAS Navigator2 can only be used to change LAN ports that are connected to the same network subnet as the computer. To change the LAN port on a different local area side, change the IP address by navigating to *Network - IP Address* in Settings.

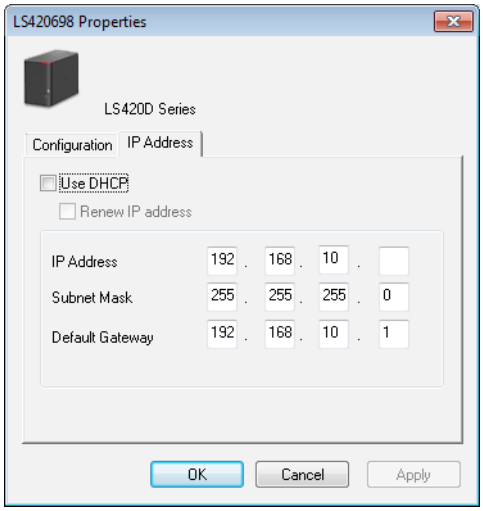
1 Double-click the icon on the desktop.
NAS Navigator2 will start.

Note: For Mac OS, click the icon in the Dock.

2 Right-click on your LinkStation's icon, then choose *Properties - IP Address*.

Note: For Mac OS, click the LinkStation's icon while holding down the control key, then click *Configure - IP Address*.

3 Enter the IP address and subnet mask, then click *OK*.



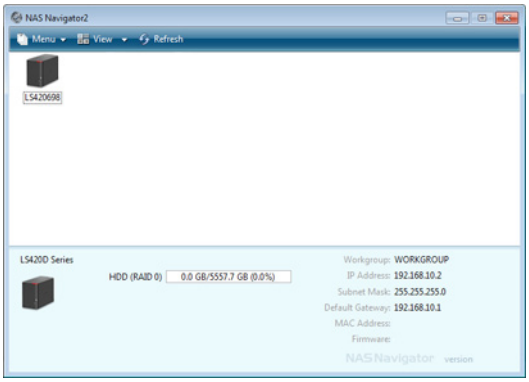
Chapter 9 Utilities

NAS Navigator2 for Windows

NAS Navigator2 is a utility program that makes it easy to display Settings, change the LinkStation's IP address, or check its hard drive. If you install the LinkStation with the LinkNavigator CD, NAS Navigator2 was installed automatically.

NAS Navigator2 will run in the system tray when the computer is on.

To launch NAS Navigator2, double-click the icon.



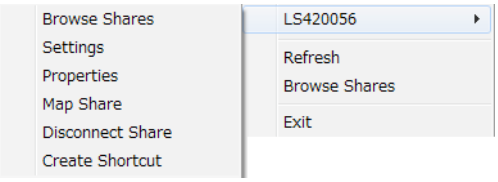
Click your LinkStation's icon to open the share on the LinkStation and display:

- Total capacity
- Capacity in use
- IP address
- Workgroup
- Subnet mask
- Default gateway
- MAC address
- Firmware version

Name		Description
Menu	Map Share*	Assigns the LinkStation's shared folder as a network drive.
	Disconnect Share*	Unmaps the network drive.
	Map All Remote Shares to Drive Letters	Assigns all the LinkStation's shared folders as network drives.
	Create Desktop Shortcut*	Create a shortcut to the LinkStation's shared folder (share).
	Launch NAS Navigator2 on Startup	Launches NAS Navigator2 in the system tray when Windows boots.
	Display Errors	If an error occurs, an error message will pop up from the NAS Navigator2 icon in the system tray.
	Properties*	Opens the selected LinkStation's Properties window.
	Close	Close NAS Navigator2.
	View	Icons: Display icons. Details: Displays hostname, product name, Workgroup, IP address, subnet mask, and default gateway.
	Sort by	Selects the sort order from following to display when multiple LinkStations and TeraStations are found: hostname, product name, workgroup, IP address, subnet mask, and default gateway.
Browse*		Opens the LinkStation's shared folder.
Refresh		Searches for NAS devices on the network again.
Displayed when you right-click a device's icon.	Browse Shares	Opens the LinkStation's shared folder.
	Settings	Opens Settings of the selected LinkStation.
	Properties	Opens the LinkStation's properties page.
	Map Share	Assigns the LinkStation's shared folder as a network drive.
	Disconnect Share	Unmaps the network drive.
	Create Shortcut	Creates a shortcut icon to the shared folder share on the desktop.

*Click once on the LinkStation or TeraStation's icon to display these options.

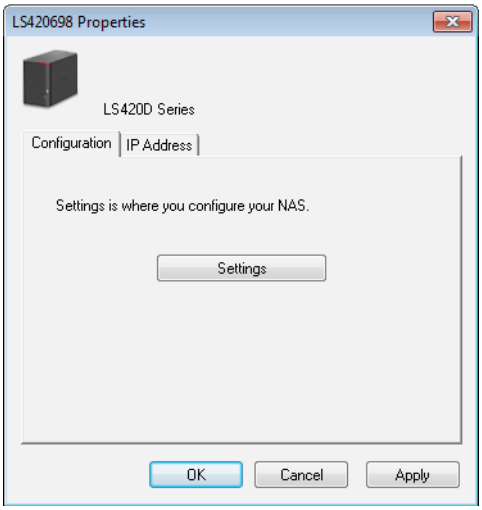
When NAS Navigator2 is minimized, right-click on the NAS Navigator2 icon in the system tray for the following options.



Name		Description
NAS Name	Browse Shares	Opens the LinkStation's share folder.
	Settings	Opens Settings of the selected LinkStation.
	Properties	Opens the LinkStation's properties page.
	Map Share	Assigns the LinkStation's shared folder as a network drive.
	Disconnect Share	Unmaps the network drive.
	Create Shortcut	Creates a shortcut icon to the LinkStation's shared folder (share) on the desktop.
Refresh		Refreshes list of NAS devices.
Browse Shares		Opens NAS Navigator2 window.

Exit	Exits NAS Navigator2.

The following tasks may be performed from the LinkStation's properties window.



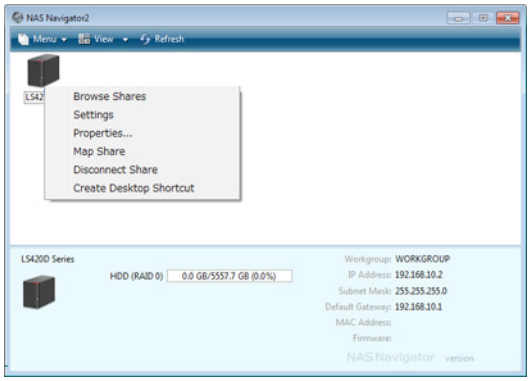
Name	Description
Configuration	Click *Settings* to open the configuration interface.
IP Address	Check *Use DHCP* to assign an IP address from the DHCP server automatically. If there is no DHCP server in the network, you cannot use this function. Check *Renew IP address* to obtain an IP address from the DHCP server. You can manually enter an IP address, subnet mask, and default gateway.

Mount as Network Drive

You can easily map a shared folder as a network drive using NAS Navigator2.

1 Double-click the icon on the desktop.
NAS Navigator2 will start.

2 Right-click on the LinkStation's icon, then click *Map Share*.



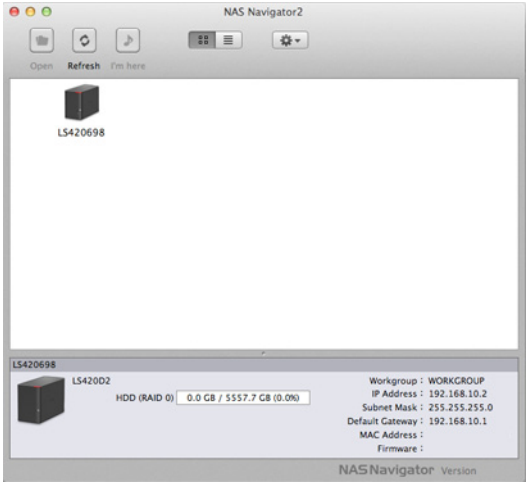
Note: Note:
Following name of shared folders can be mounted as a network drive using NAS Navigator2. If the name is different, mount the shared folders using Windowns option: share, share2, share3, share4, usbdisk1, usbdisk2, usbdisk3, usbdisk4, usbdisk5

3 An icon for the mapped share will appear in Computer or My Computer. You can use this network drive just like any other hard drive.

NAS Navigator2 for Mac OS

NAS Navigator2 is a utility program that makes it easy to display Settings, change the LinkStation's IP address, or check its hard drive.

If you installed the LinkStation with the LinkNavigator CD, NAS Navigator2 was installed automatically. To launch it, click the icon i the Dock.



Click your LinkStation's icon to open the share on the LinkStation and display:

- Total capacity
- Capacity in use
- IP address
- Workgroup
- Subnet mask
- Default gateway
- MAC address
- Firmware version

Name		Description
Open		Opens the default shared folder for a selected LinkStation.
Refresh		Searches for NAS devices on the network again.
The menu displayed when you click the LinkStation icon while holding down the control key.	Open Folder	Opens the LinkStation's shared folder.
	Settings	Opens Settings of the selected LinkStation.
	Configure	Displays the screen to open Settings or change in IP address.
	Label Color	Selects the color of the name displayed below icon. The menu below is displayed when you click the LinkStation icon while holding down the control key.

Mount as Network Drive

You can map the shared folder as a network drive using NAS Navigator2 on Mac OS.

1 Click the NAS Navigator2 icon in the Dock.
NAS Navigator2 will launch.

2 Click the LinkStation icon while holding down the control key, then select *Open Folder*.
Enter a username and password with the rights to access the shared folder of the LinkStation.

3 Select the shared folder that you want to mount, then click *OK*.

4 A drive icon

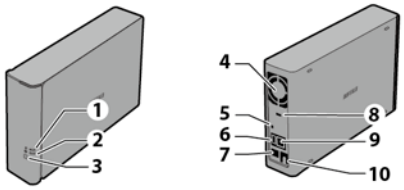
will appear on the desktop. The shared folder is now mounted as a network drive.

Note: To dismount the share, drag the share icon to the trash.

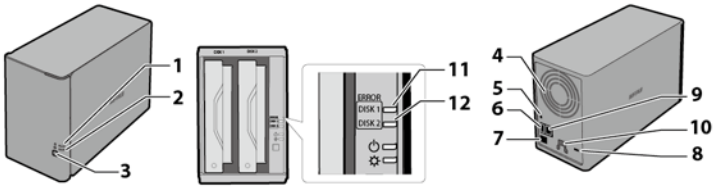
Chapter 10 Appendix

Diagrams

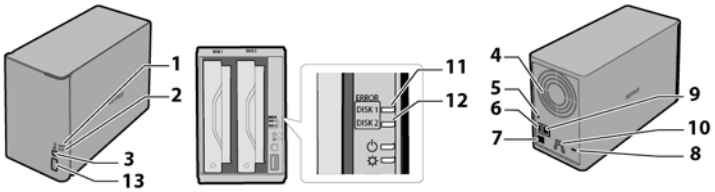
LS410D



LS420D



LS421DE



1 Power LED
The white power LED is lit while the LinkStation is on.
The white power LED blinks while booting or shutting down.
The red power LED blinks when an error occurs.
If there is a status message, the power LED glows amber.
If there is a new firmware, the power LED blinks amber.

2 Function LED
The white function LED is lit while initializing and unmounting the USB device for about 60 seconds.

3 Function Button
Use this button for dismounting USB devices and initializing settings.

4 Fan
Do not block the fan.

5 Power Button

Move the switch up and down to power on and off.

6 USB 2.0 Port
Compatible Buffalo USB hard drives, USB flash drives, and USB printers can be connected. USB hubs are not supported.

7 Power Connector
Use the included power cable to connect to a surge protector or outlet.

8 Anti-Theft Security Slot
Use this slot to secure your LinkStation with a cable lock (not included).

9 LAN Port
Connect to a router, hub, or switch on your Ethernet network with the included Ethernet cable.

10 Hook
To secure the power cable, insert it in the slot as shown.

11 Not in use.

12 Not in use.

13 USB 3.0 Port (LS421DE only)
Compatible Buffalo USB 3.0 hard drives can be connected. USB hubs are not supported.

When the Power LED Blinks

White

The LinkStation is booting or shutting down.

Red

If there is an error, the red LED is lit. You may know the error code how it blinks. The error codes are also displayed on NAS Navigator2.

Place of Error Code	Status
10s Place of Error Code	The LED flashes for 1.0 second every 0.3 seconds. This gives the tens place of the error code.
1s Place of Error Code	The LED flashes for 0.5 seconds every 0.3 seconds.

Error Code	Description	Corrective Action
E07	The firmware is corrupted.	Contact Buffalo technical support for assistance.
E11	An error occurred in the fan speed.	Check that foreign objects or dust are clogging the fan. If any foreign objects or dust are found, use a pair of tweezers, air duster, or other tool to remove them. If the error is displayed again, contact Buffalo technical support for assistance.
E12	A rise in the system temperature may have exceeded the allowable safety value.	Do not place objects in the area around the LinkStation. Also, move the LinkStation to a cool location.
E13	An error occurred in the RAID array. The LinkStation is in degraded mode.	Replace the defective drive whose NAS Navigator2 or Settings shows error. Rebuild the RAID array after replacing the drive and rebooting the LinkStation.
E14	RAID array X cannot be mounted.	Run the RAID array disk check in Settings.
E15	The bad sectors have reached a dangerous level.	Replace the defective drive whose NAS Navigator2 or Settings shows error.
E16	Unable to find hard drive X.	Hard drive X may be disconnected or may be failed. After shutting down, reinstall the hard drive.
E22	Mounting of hard drive X failed.	Format the hard drive. After formatting, if the error still appears after rebooting, replace the hard drive. If the error is displayed again, contact Buffalo technical support for assistance.
E23	An error occurred, so the hard drive was removed from the RAID array.	Replace the hard drive whose NAS Navigator2 or Settings shows error.
E30	An hard drive error occurred.	Replace the hard drive whose NAS Navigator2 or Settings shows error.

Amber

If there is a status message, the amber power LED blinks. The status message is available in NAS Navigator2.

Place	Status
10s Place	The LED flashes for 1.0 seconds every 0.3 seconds. This gives the tens place of the information code.
1s Place	The LED flashes for 0.5 seconds every 0.3 seconds. This gives the one place of the information code.

Information Code	Description	Corrective Action
I10	A rise in system temperature may have exceeded the allowable safety value.	Move the LinkStation to a cool location. Do not place objects in the area around the LinkStation.
I11	The bad sectors in hard drive X may have reached a dangerous level.	Replace the hard drive X.
I12	Operating in degraded mode.	-
I13	Formatting RAID array X.	-
I14	Checking RAID array X.	-
I15	Examining the error status of RAID array X. **Note:** Transfer speeds are slower during the examination process.	-
I16	Creating RAID array X.	-
I17	Resynchronizing RAID array X. **Note:** Transfer speeds are slower during resynchronization.	-
I18	Rebuilding RAID array X. **Note:** Transfer speeds are slower during the rebuilding process.	-
I19	Writing 0s to RAID array X, erasing all data.	-
I20	Formatting hard drive X.	-
I21	Checking hard drive X.	-
I22	Erasing the data for hard drive X.	-
I25	Updating the LinkStation firmware. **Note:** Do not turn off the power during the updating process.	-
I26	Initializing all settings.	-
I27	Checking USB hard drive.	-
I28	Formatting USB hard drive.	-
I46	Data migration or conversion (RAID migration) is in progress.	Do not turn off the LinkStation power.
I47	Data migration or conversion (RAID migration) is in progress.	Do not turn off the LinkStation power.
I52	A new firmware version has been released.	Update the firmware.
I54	X th backup task has been failed.	Make sure X th backup task is configured correctly. ("X" is backup task number.) The LinkStation or TeraStation may be in standby mode. Start the NAS on. If the backup task still fails, check the status of NAS, network, and backup source or destinations.

Steady Amber

While the function LED glows a steady amber, a new firmware version has been released. Update the firmware to new version.

Default Settings

Administrator's Name	admin
Password	password
Shared Folders	"share" (for both Windows and Mac computers). The recycle bin is enabled on "share" by default.
DHCP Client	Normally, the LinkStation will get its IP address automatically from a DHCP server on the network. If no DHCP server is available, then an IP address will be assigned as follows: IP address: 169.254.xxx.xxx (xxx is assigned randomly when booting the LinkStation.) Subnet mask: 255.255.0.0
Registered Group	"hdusers", "admin", and "guest" You cannot edit or delete them.
Microsoft Network Group Setting	WORKGROUP
Ethernet Frame Size	1518 bytes (Including 14 bytes of the header and 4 bytes of FCS)
AFP	Enabled
FTP	Disabled
NTP	Enabled
Print Server	Enabled
WebAccess	Disabled
Time Machine	Disabled
DLNA Server	Disabled
iTunes Server	Enabled
BitTorrent	Disabled
USB Device Server	Disabled

Specifications

Check www.buffalotech.com for information about the latest products and specifications.

LAN Port	Interface	IEEE802.3ab (1000BASE-T) IEEE802.3u (100BASE-TX) IEEE802.3 (10BASE-T)
	Transfer Speed	1000 Mbps Full duplex (auto-negotiation) 100 Mbps Full duplex/Half duplex (auto-negotiation) 10 Mbps Full duplex/Half duplex (auto-negotiation)
	Number of Port	1 Port (supports AUTO-MDIX)
	Connector Type	RJ-45 8-pin
	Protocol	TCP/IP
	Access Method	CSMA/CD
	File Sharing	SMB/CIFS, AFP, FTP
	Management	HTTP/HTTPS
	Jumbo Frame	1518/4102/7422/9216 bytes (Including 14 bytes of the header and 4 bytes of FCS)
USB Port	LS420D, LS410D: USB 2.0 Port (Series A) x 1 LS421DE: USB 2.0 Port (Series A) x 1, USB 3.0 Port (Series 1) x 1 **Note:** Compatible USB devices: supported USB devices including Buffalo USB hard drives and printers	
Internal Hard Drive	If a hard drive in LS420D and LS421DE malfunctions, replace it with a Buffalo OP-HD/LS series of the same capacity, available from www.buffalotech.com.	
Power Supply	AC 100 - 240 V, 50/60 Hz	
Power Consumption	LS410D: max ~24 W LS420D: max ~48 W LS421DE: max ~48 W	
Dimensions (WxHxD) / Weight	LS410D: 45 × 128 × 205 mm (excluding protruding parts)/ ~1.3 kg (2.8 lb.) LS420D: 87 × 128 × 205 mm (excluding protruding parts)/ ~2.4 kg (5.2 lb.) LS421DE: 87 × 128 × 205 mm (excluding protruding parts)/ ~2.4 kg (5.2 lb.)	
Operating Environment	Temperature: 5-35°C; 41-95°F Environment humidity: 20-80% (no condensation)	
Compatibility	Windows and Mac computers with Ethernet interface **Note:** The LinkStation requires an Ethernet connection with your computer for operation. It cannot be connected via USB.	
Supported OS	Windows 8*, Windows 7*, Windows Vista*, Windows XP, Windows 2000, Windows XP Media Center Edition (2004 or 2005), Windows Server 2012, Windows Server 2008 OS X 10.8, 10.7, 10.6 *32-bit and 64-bit	

Compliance Information

FCC Warning

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference

to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CE Mark Warning

This is a Class B product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Environmental Information

- The equipment that you have purchased required the extraction and use of natural resources for its production.
- The equipment may contain hazardous substances that could impact health and the environment.
- In order to avoid the dissemination of those substances in our environment and to diminish the load on natural resources, we encourage you to use the appropriate take-back systems.
- The take-back systems will reuse or recycle most of the materials of your end of life equipment appropriately.
- The crossed-out wheeled bin symbol invites you to use those systems.
- If you need more information on the collection, reuse and recycling systems, please contact your local or regional waste administration.

KC

기종별	사 용 자 안 내 문
B급 기기(가정용 정보통신기기)	이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든지역에서 사용할 수 있습니다.

Models

LS410D series, LS420D series, LS421D series

LS410DE, LS420DE, LS421DE

LS410D0101, LS420D0202, LS421D0202

LS410D0201, LS420D0402, LS421D0402

LS410D0301, LS420D0602, LS421D0602

LS410D0401, LS420D0802, LS421D0802

LS410DEV5, LS420DEV5, LS421DEV5

LS410D0101V5, LS420D0202V5, LS421D0202V5

LS410D0201V5, LS420D0402V5, LS421D0402V5

LS410D0301V5, LS420D0602V5, LS421D0602V5
LS410D0401V5, LS420D0802V5, LS421D0802V5